BUILDING MENTAL HEALTH LITERACY WITHIN ONTARIO (CANADA) HEALTH AND PHYSICAL EDUCATION

Research Article

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Abstract

The primary research question which drove this analysis asked: What is Mental Health Literacy (MHL) and how is this accomplished in elementary schools in Ontario, given the new directives within the 2019 Health and Physical Education curricular document? Utilizing a qualitative research mode, the understanding of MHL was investigated through a summative latent content analysis of the current Ontario provincial government positions arising from the recent release of 2019, Ontario Health and Physical Education curricular document. The document of 320 pages is broad and somewhat deep instigating several secondary questions which asked: How should MHL be achieved in Health and Physical Education? What level of MHL awareness should Ontario Physical Educators and students reach for at the elementary level? What are the existing MHL guidelines and orientations impacting Ontario teachers? To what extent are Ontario teachers urged via the new curricula to focus and emphasize MHL in schools. MHL is a priority in this era of pandemic and critical to growth and development of teachers, students and the wider community accounting for well-being or lack of therein.

Keywords: mental health literacy, health and physical education, curriculum, pedagogy

1. Introduction

The purpose of the present study was to explore and understand Mental Health Literacy (MHL) as revealed within the 2019 Ontario Health and Physical Education curricular document. The 2019 health and physical education elementary document includes "new expectations on mental health literacy; new expectations on social-emotional learning skills, to be taught in connection with all parts of the curriculum; and enhanced connections to mental health within existing curriculum expectations" (Ontario Ministry of Education, 2019, p.6). MHL can help students and teachers identify, understanding and respond to mental illnesses, while, lessening stigma and infusing well-being (Kutcher & McLuckie, 2010; Ryan & Munn, 2014). Educational facilities are actually an "ideal environment in which to address the mental health needs of children and adolescents" (Atkins et al., 2017; Vamos et al., 2020). However, at present there is a pervading belief that many elementary and secondary youth misapprehend mental health and mental illness (Coles et al., 2016; Ryan & Munn, 2014; Teng et al., 2017); therefore given the need to address growing mental health issues and challenges a new level of expectation for MHL is required and quite important in education (Vamos et al., 2020).

Education is pervasive in all regions of Canada, especially Ontario, and in general is one of the "key settings identified as a common denominator to address poor health literacy around the globe" (Vamos et al., 2020, p.2). Therefore, education appears to be a most appropriate arena to address MHL by adding Mental Health (MH) as a centrepiece within the new Ontario health and physical education curriculum. Indeed, it has been past practice to educate in schools as these institutions can "reach all school-aged children over a long period

of time making them a perfect target for long time interventions to develop and strengthen health literacy capacities" (Vamos et al., 2020, p.2). This belief that MH and MHL is a priority is both fortuitous and entrenched in 2019 the provincial government of Ontario new elementary health and physical education document. A number of expectations for students and teachers to explore and attain, suggest, "students will learn the skills needed to be successful in life as active, healthy, and socially responsible citizens" (Ontario Ministry of Education, 2019, p.7), by completing this curriculum in grades one through eight. Over this extended period of education beginning at approximately age six until age thirteen the new elementary "curriculum expectations related to this topic provide a specific progression of learning across the grades that is designed to develop students' mental health literacy" (Ontario Ministry of Education, 2019, p.44).

Herein it is understood that Mental Health includes emotional, psychological, and social well-being (Keyes, 2006), and most students and teachers will need to further learn and appreciate that MHL "is a state of well-being in which the individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his own community" (Mental Health Commission of Canada, 2012, p. 14). A teacher is well positioned to monitor this well-being as an educator will work with students daily over many hours in various challenging personal and academic situations (OECD, 2019). More precisely, Canadian teachers (K-12) dedicate approximately twenty-one hours per week working with students building relationships, teaching and coaching (OECD, 2014). Education is better if people are coping, productive and moving forward with others, and this is accomplished in a school system that is supportive and aware of MHL.

A recent OECD (2019) document entitled: Future of Education 2030 - Making Physical Education Dynamic and Inclusive for 2030 - International Curriculum Analysis only mentions MHL twice in 105 pages, yet to be fair Mental Health is noted 38 times and Mental illness only once. Clearly more of an emphasis need be cast upon MHL in view of the changed world, post pandemic. Mental health challenges for educators in 2020 and beyond certainly revolve around the closure of schools and mandated daily behavioural changes (masking/staying at home) due to the pandemic. Mental health challenges arising due to the pandemic can include "any psychological, social, emotional, or behavioural problem that interferes with the students' ability to function" (Reinke et al., 2011, p. 4). While it may be more difficult to stay in touch during the pandemic, technology does offer some respite as people reach out digitally. Within the next few years MHL will continue to be something for all to be mindful of since the pandemic has shifted our daily lives and made other modes of education both practical and necessary.

In times previous to the pandemic, and hopefully following the closures, school students will again be assessed and evaluated in many areas such as literacy, social skills, and relationships with others, and this is actually "another way of conceptualizing health literacy. . . . to categorize the capabilities into basic/functional literacy skills, communicative/interactive, and critical literacy" (Vamos et al., 2020, p.1). This assessment and evaluation process of learning is "integral to the development of social-emotional skills and the understanding of connections between physical and mental health that are incorporated across the curriculum" (Ontario Ministry of Education, 2019, p.44). Educators and others need be mindful that MHL "involves the skills needed to get, understand and use information to make good decisions for health" (Ontario Ministry of Education, 2019, p.7).

MHL has undergone various changes over the past decade for instance, the Canadian Public Health Association's Expert Panel on Health Literacy (HL) (2008) "defines it as the ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course" (Ontario Ministry of Education, 2019, p.7). We now know or should understand that merely increasing MHL is but one pathway to support and modify the means new teachers advance mental health issues personally and change how new educators communicate with their students to diminish negative outcomes, which present due to wanting MHL (Ryan & Munn, 2014; Whitley et al., 2013). MHL is particularly significant in an educational landscape since the elementary level is primary territory for children and youth to develop various mental health disorders (Vamos et al., 2020; Whitley et al., 2013). Indeed, the environment one is situated in can be impactful therefore some researchers have concluded that "school climate is a multidimensional construct that has been shown to have an impact on students, teachers, and other school personnel within the school environment" (McLean et al., 2017, p. 238).

Increasing educator understanding of MHL has the potential to lessen stigmatizing attitudes teachers may retain concerning MHL issues (Mcluckie et al., 2014; Ryan & Munn, 2014). In the past it was possible to suggest that a majority of educators did not receive any MH training or professional development; some educators may believe they are unprepared to support students (Froese-Germain & Riel, 2012). Nevertheless, by increasing MHL in pre-service many teachers in Health and Physical Education, using the 2019 curricular document, will increase their knowledge, awareness and understanding of the ways in which educators can support students who have MH needs (Hoglund et al., 2015).There is much work to do since the odd dated study has concluded that most teacher training programs in Ontario omit or overlook MHL in their programs of study (Rodger et al., 2014). Certainly, this lack of attention in the past towards MHL is changing with new curricular documents and the impact of the pandemic is guiding educational stakeholders to focus on MHL hereafter.

2. Method

This investigation utilized a qualitative summative content analysis (QSCA) (Zhang & Wildemuth, 2009; Elo et al., 2014) partly understood as "a systematic, replicable technique for compressing many words of text into fewer content categories (headings) based on explicit rules . . ." (Stemler, 2001, p.1). Such a QSCA "involves counting and comparisons, usually of keywords or content, followed by the interpretation of the underlying context" (Hsieh & Shannon, 2005, p.1277). QSCA involves both data reduction and sense-making after taking a volume of qualitative material and identifying core consistencies and meanings (Kindermann, 2020; Patton, 2002). A basic unit of analysis, in this case, MHL, links well to a basic unit of text identified during this QSCA.

QSCA diverges from the positivist tradition via primary "assumptions, research purposes, and inference processes, thus making the conventional criteria unsuitable for judging its research results" (Zhang & Wildemuth, 2009, p.310). In QSCA text is revisited to concentrate, reassess and reconstitute interpretations (Schreier, 2012) to advance insights, producing a schematic to guide the inquiry (Kindermann, 2020). QSCA is "a research method for the subjective interpretation of the content of text data" (Hsieh & Shannon, 2005, p.1280). QSCAC permits users to describe and summarize text to reveal new perspectives (Schreier, 2012) while reaffirming theory and findings (Kindermann, 2020).

Content analysis is "a research method for the subjective interpretation of the content of text data" (Hsieh & Shannon, 2005, p.1280), that reveals explanations and perspectives (Schreier, 2012), while authenticating (Berelson, 1971; Kindermann, 2020).

Herein, the Provincial curriculum document was read and reread repeatedly to develop a list of common terms and frames of reference (Bowen, 2009). MHL related terms arose and included Health, HL, Mental Health Literacy and Wellness, which were used as search terms within the text analysis. The MHL focus was a mode and tool to filter text and arrive at frequency counts for terms via the review function of Microsoft Word finding. The term searches led to highlighting/counts and frequencies for each term, for example, the words Mental Health was highlighted 32 times in the 320-page curriculum document and Wellness appeared more than 30 times. If the word occurred ten times or more it was deemed significant and related material was used to address each term herein.

3. Ontario (Canada) Health and Physical Education

Ontario Children's Mental Health Ontario (2017) recently found that half of Ontario parents are concerned about their child's mental health leading to about one-third of these parents to encourage skipping school due to a child's mental health. Given that almost twenty-five percent of "Canadian youth suffer from mental health difficulties (Waddell et al., 2013), it is crucial that a "school's climate reflect an understanding and sensitivity towards student mental health and that schools are able to effectively address and support students' mental health challenges" (Ruddy, 2019, p.17). This forward thinking complements the recent research by Atkins et al. (2017) which concluded that educational institutions are ideal venues to address the MH if they are invitational, informed and inclined.

MHL is a basis for prevention of mental health issues (Coles et al., 2016), and supports the identification, management, and prevention of mental health issues (Ryan & Munn, 2014; Smith et al., 2019). This understanding of MHL has prompted the Ontario government to update and improve the Healthy Living strand in the new Ontario Health and Physical Education (2019) curricula which helps students "develop an understanding of the factors that contribute to healthy development, a sense of personal responsibility for lifelong health, and a respect for their own health in relation to others and the world around them" (p.39). MHL is mentioned several times within the 320 pages of the new curricula, it is defined, linked to many variables and described as teachable via scripts that include teacher prompts and possible student answers. MHL cannot be overlooked by any new or experienced person reading the 2019 document as MHL is a topic clearly listed in grades one to eight. For instance, on page 44, MHL is noted multiple times as is the case on many pages which piques a reader's eye and thoughts.

School remains something that is liked according to a recent study by Youth Mental Health Canada (2019) entitled: Analysis of Youth Mental Wellness Survey which also found most (80%) of the students felt safe at school and a similar number felt close to people at school. In 2019 and beyond in Ontario, educators will help students advance HL as students research, learn and develop new knowledge and skills needed to maintain, and experience "healthy living, as well as to solve problems, make decisions, and set goals that are directly related to their personal health and mental health and well-being. Learning how to establish, monitor, and maintain healthy relationships" (Ontario Ministry of Education, 2019, p.39), remains a higher-level expectation within the Ontario elementary curriculum.

As key elements are linked there is an amalgamation of "social-emotional learning skills and mental health concepts throughout the curriculum, and through the mental health literacy expectations in the Healthy Living strand, the topic of suicide may arise in discussions with students" (p.41).

Figure 1. Healthy active living (Ontario Physical Health Education Association, 2019).

The relationship between MHL, MH and mental illness is one that demands attention in schools, and it is through such images as illustrated in the healthy active living figure that the relationships can be communicated. Visual images such as this bind healthy living, with living, personal, and interpersonal skills in a manner that is memorable. Teaching health and physical education in 2020 requires an informed perspective advanced by caring adults who recognize that the topics related to health need to be addressed in a sensitive manner. For instance, "learning about suicide is best approached through structured, developmentally appropriate, adult-led instruction. It is important to conclude discussions with stories of hope, and information about seeking help" (Ontario Ministry of Education, 2019, p.41). Addressing such topics can inform healthy active living by supplying a perspective that is both instructive and guiding (Ryan & Munn, 2014).

Beyond the healthy active living figure one above, and embedded in the Ontario health and physical education elementary curricular text, is the health strand or theme which is divided into five areas including, "healthy eating; personal safety and injury prevention; substance use, addictions, and related behaviours; human development and sexual health; and mental health literacy. These topics have been chosen because they are fundamentally connected to students' daily lives" (Ontario Ministry of Education, 2019, p.41), and can influence well-being while focusing upon a pathogenic disease prevention perspective of health promotion (Kickbush, 2017).

3.1 Mental Health: Instruction and Needs

Current positions suggest HL is "achieved and used across many settings (e.g., school, home, workplaces, government) achieving health and wellness for individuals, families, communities, and nations" (Vamos et al., 2020, p.2). However, schools "can reach all school-aged children over a long period of time making them a perfect target for long time interventions to develop and strengthen health literacy capacities" (Vamos et al., 2020, p.2). The responsibility to lead, coach and teach many young people about such sensitive topics over an extended period of time places pressure on the educators which creates stress that is at times difficult to manage. As a result of enduring pressures educators are particularly prone to mental burnout (Larrivee, 2012; Ryan & Lielkalns, 2011), and schools often provide little support for educators. Mental health needs of educators in schools offer an indication of adult mental health issues (Kutcher, Wei, McLuckie, & Bullock, 2013). HL for adults and students has recently been "described as a concept, a process, an outcome and a public health goal. We know that lower health literacy is associated with poorer health outcomes and health behaviors" (Vamos et al., 2020, p.2), which can impact all aspects of well-being at school and in the community. All of us are susceptible to psychological stress (mental health) which can creat a mirroring of need amongst people in schools (Arens & Morin, 2016; Oberle & Schonert-Reicl, 2016).

Contemporary instruction need be constructivist in nature, student-centred, and when possible experiential. The "constructivist view of learning position is that an active, self-regulated, goal-directed, and reflective learner constructs personal knowledge through discovery and exploration in a responsive learning environment" (Tennyson, 2010, p. 7). The social aspects where students with peers and educators intermingle is pedagogy as Murphy (2008) suggests that pedagogy involves "interactions between teachers, students, and the learning environment and the learning tasks" (Murphy, 2008, p. 35) in a learner-centered manner. "Students are more likely to become engaged with authentic academic work that intellectually involves them in a process of meaningful inquiry to solve real life problems that extend beyond the classroom" (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003, p.159).

The Ontario health and physical education teacher is a, "co-learner and facilitator, promotes authentic experiential learning and learning through inquiry, provides engagement through student-initiated work, creates a sense of community through teamwork and collaboration" (Ontario Health & Physical Education, 2019, p.55). Hands-on, authentic problems and projects (in class health fair, debates, discussion of community needs, video analysis of movies, guest speakers) that are developmentally appropriate offer all students a means to opt in within an environment that is respectful, safe and planned. Above all, "students of all social and cultural back- grounds, abilities, sexes, gender identities, gender expressions, and sexual orientations – feel included and recognized in all activities and discussions" (Ontario Health & Physical Education, 2019, p.63). In order to include all student's instruction is "based on principles of universal design and differentiated instruction focuses on the provision of accommodations to meet the diverse needs of learners" (Ontario Health & Physical Education, 2019, p.63). In addition, some students may need modifications:

> Modification may also include the use of expectations at a different grade level. Modified expectations must represent specific, realistic, observable, and measurable goals, and must describe specific knowledge and/or skills that the student can demonstrate independently, given the appropriate assessment accommodations. (Ontario Health & Physical Education, 2019, p.67).

All instruction need be channeled via student abilities and by adjusting rules, activities and approaches students and teachers can build quality bonds that are inclusive and respectful.

Pedagogy is really about the social construction of human relations with all stakeholders including students, peers, and professional colleagues, that can enhance job satisfaction for all educators (Vamos, 2007) which may ward off professional burnout (Uzman & Telef, 2015). From the onset of Ontario teacher training which unfolds over two years of study, preservice Health and Physical educators in 2020 are made aware that "healthy relationships are based on respect, caring, empathy, trust, and dignity, and thrive in an environment in which diversity is honoured and accepted" (Ontario Health & Physical Education, 2019, p. 73). Positive relationships create a class that is encouraging and supportive as we learn from one-another it is possible to establish a warm mentoring environment that provides support to all. Teachers in-service and in pre-service teacher training demonstrate care and model cooperation with colleagues, while learning, discussing and debating diversity in schools and the wider community. Teaching is about building relationships with an emerging community and this challenge repeats itself each year as new student faces surface annually.

3.2 Learning about Mental Health and Mental Illness

As a Health and Physical Educator there is a desire to be aware of, and understand, both the content and the means to teach this content. Pedagogy is about interaction and the implementation of planned actions, embedded in learning principles and human development theory which is "directed toward both instructional delivery and classroom management, that increase the probability of affecting a positive change in student behaviour "(Levin & Nolan, 2004, p. 16). An Ontario Health and Physical Education teacher need be informed, aware and understand what needs to be planned in the school year, term and daily classes. This informed stance can only come about by reading the new 2019 curriculum guide which is quite supportive, guiding and current. As Ontario teachers set foot in Health classes, they bring with them backgrounds and histories that at times are essential to achieve certain curriculum expectations.

Educators currently need to read and study the Health and Physical Education document to prepare, plan and eventually teach Health and Physical Education. The Ontario elementary educator will continue to learn while reading the curriculum repeatedly, as they plan, educators are motivated knowing that "limited health literacy is negatively associated with multiple health outcomes" (Benes & Alperin, 2019, p.30) which are not all positive. Consequently, enhancing student ability to understand, assess, and communicate health information as a means to encourage, preserve and increase health in various settings across the life-course is important and a means to motivate educators who strive to educate students (Fleary et al., 2018).

Enhancing student ability means Ontario elementary students will learn that MH is distinctive from mental illness and something "all people have and that it is a significant contributor to overall health. Students learn to explore the connection between thoughts, emotions, and actions and to see how they can impact mental health" (Ontario Health & Physical Education, 2019, p.44). The HL of individuals "plays a fundamental role in chronic disease self-management as well as individual's day-to-day functioning" (Vamos, 2012, p.38). Positive MH in the words of the Public Health Agency of Canada, is "the capacity of each and all of us to feel, think, act in ways that enhance our ability to enjoy life and deal with the challenges we face. It is a positive sense of emotional and spiritual well-being that respects the importance of culture, equity, social justice, interconnections and personal dignity" (Ontario Health & Physical Education, 2019, p.309).

Ontario students are expected to "explain how word choices and societal views about mental health and mental illness can affect people and perpetuate stigma and identify actions that can counteract that stigma" (Ontario Health & Physical Education, 2019, p.290). The curriculum guide actually provides a guiding script to support teachers, for example:

Teacher prompt: "Mental health is often misunderstood, and when people hear someone mention 'mental health', they may automatically think 'mental illness'. Negative feelings or judgements about mental illness can be the result of not under- standing or of being afraid. We all have 'mental health'. How might societal views on mental health and mental illness perpetuate stigma and even cause harm?"

Student: "They can stop people from getting the help they need. If people who have a mental illness do not feel safe to talk about it or to get help, they can end up feeling hopeless, lonely, and hurt."

Teacher: "There are lots of things that we can do individually or as part of a group to address stigma and help get rid of it. The way we treat people and talk about mental health and mental illness is one way. There are also groups and organizations in the community

that we can be a part of that help create awareness about mental health. Can you think of some ways that you could take action to reduce stigma associated with mental health?"

Students: "Lots of schools, like ours, have wellness clubs that create awareness and plan events to bring attention to the importance of mental health. They also provide an opportunity for us to learn about different strategies and to support one another. I know that there are also youth groups in the community and even across the province that focus on mental health and on giving youth a way to use their voice to help bring about change. I think being involved in groups like this not only helps others, but can make us feel good too, because we're being a part of something bigger and we're doing something that is making a difference." (Ontario Health & Physical Education, 2019, p.290)

This script helps the educator initiate and move forward in class as student awareness and understanding grows. This is essential since the Canadian Public Health Association (2014) found that "increasing rates of chronic diseases in the Canadian population require individuals to manage their own care more than before" (p.6). By beginning the conversation with young students they are invited to share, and by sharing in a safe respectful environment "students learn to identify when help is needed – for themselves and for others – by learning to recognize signs of stress and by developing an understanding of the body and brain's response to stress" (Ontario Health & Physical Education, 2019, p.44). Mental illness can be introduced, discussed and in doing so students realize that mental illness is somewhat commonplace in society and includes a range of illnesses that "are characterized by alterations in thinking, mood or behaviour associated with significant distress and impaired functioning" (Ontario Health & Physical Education, 2019, p.44). A mental illness is hopefully something clinically diagnosed, once a person reaches out for help, for instance, mental illnesses includes various disorders such as mood, personality and anxiety; depression; and schizophrenia which affects the ability to function (Government of Canada, 2020). Often the illness begins early in life and presents later in adolescence and/or adulthood and knowing what to look for can help a person reach out for help or help another person support another who they believe is unwell.

4. Conclusion

From the onset the purpose was to explore Mental Health Literacy (MHL) within the 2019 Ontario Health and Physical Education curricular document. MHL was found to be a frequent term in the curricular document and a necessary topic of study early in life which this curricular guideline seems to address fortuitously. The provincial guideline suggests students need to "demonstrate an understanding of how incorporating healthy habits and coping strategies into daily routines" (Ontario Health & Physical Education, 2019, p.285), which is critical in these times of pandemic and beyond. It is important that all stakeholders including students become aware of the difference between MH and mental illness in developmentally suitable ways, progressively increasing their understanding of the impact that any stigma associated with mental illness can have on people and society (Ontario Health & Physical Education, 2019, p.44). Ontario elementary Students are further encouraged to "learn to support their own and others' mental health by developing a range of skills and strategies and by making healthy choices with respect to mental health" (Ontario Health & Physical Education, 2019, p.44). These are ambitious goals at the elementary level yet MHL is something all people need to grasp from an early age as the global landscape becomes more complex and challenging for all.

In sum, the Ontario Ministry of Education states within the 2019, Ontario Elementary Health & Physical Education curricular guide: "I think the best thing we can do is show kindness and compassion. Listening to others, respecting what is different and unique about

everyone, and showing empathy for other people's feelings and experiences encourages others to respond in the same way" (p.290). If elementary school students are able to achieve this, the future is bright for all who eventually graduate and take on roles beyond school.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE EFFECT OF MULTIMEDIA INSTRUCTIONAL PACKAGES ON STUDENTS' ACADEMIC ACHIEVEMENT IN BIOLOGY

Research Article

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THE EFFECT OF MULTIMEDIA INSTRUCTIONAL PACKAGES ON STUDENTS' ACADEMIC ACHIEVEMENT IN BIOLOGY

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Abstract

This study examined the effects of computer-based multimedia instructional packages on the academic achievement of students offering Biology in Senior Secondary Schools in Ibadan, Oyo State, Nigeria. Two multimedia instructional packages were designed for the study. The study adopted the pretest-posttest, control group, experimental research design. The population of the study consists of 80 randomly selected students from three secondary schools in Ibadan, Oyo State, Nigeria. The samples were randomly assigned to three groups (one control and two experimental groups). The moderating effects of gender and learning styles were also tested. The results showed that there was a significant main effect of treatment on students' achievement in Biology ($F_{(2, 58)} = 27.18$; $P < 0.05$; partial eta square = 0.48). Also, gender had no significant main effect on students' performance ($F_{(1, 58)} = 3.97$; $P > 0.05$; Partial eta square = 0.06). It was therefore concluded that multimedia instructional packages significantly enhanced students learning of Biology concepts than the conventional strategy, regardless of gender and the preferred learning style of students. Therefore, it was recommended that more multimedia instructional packages be designed and used in secondary schools for effective and efficient teaching and learning of Biology.

Keywords: multimedia instructional packages, academic achievement, Biology, teaching strategy, learning styles, gender

1. Introduction

Teaching Science, Technology, Engineering and Mathematics related contents have been challenging to many educators. Traditional teaching methods are dominating science classrooms and these methods have incessantly posed challenges to both the learners and the teachers over the years. Biology is an integral part of science and is one of the core foundational science subjects' students are exposed to prepare them for future scientific explorations and endeavours (Amonsa & Bassey, 2017). Biology has been a very important subject in the field of science and has been linked to most human activities including those of food, water, health, ecosystem management, agriculture and conservation, amongst several others. Biology literacy has, therefore, become relevant for everyone all over the world because of the awareness it brings.

Biology is one of the core subjects in Nigeria secondary school curriculum and is the branch of science that provides students with adequate and relevant skills for problem-solving, critical thinking, communication, and objective reasoning, all of which are 21st-century skills that will make them relevant in the future place of work (Oghenevwede, 2019), and teachers, who are the curriculum implementers are saddled with the responsibility of ensuring that the objectives of the subject are achieved.

However, over the years, the performance of students in the subject has been appalling. Biology education seems to be failing as many students perceive Biology to be boring. This

poor perception is attributed to the high level of abstraction and invisibility of phenomenon and processes of Biology concepts (Agboghoroma & Oyovwi, 2015; Ahmed & Abimbola, 2011; Cimer, 2012; Etobro & Fabinu, 2017). This problem has been identified by researchers as instrumental to the poor performance of students in the subject, thereby making it difficult to achieve the objectives as stipulated in the National Policy of Education (FME, 2009), and making it increasingly difficult for Nigeria to achieve her vision of becoming one of the 20 most developed countries in the world by the year 2020 (Inegbenebor, Socilis, Nduka, Salawu, & Onyisi, 2018).

Differences has been noticed in the academic performance of students in secondary schools, and these differences have been attributed to a multiple variables involved in the learning process. Two of such variables mentioned in literature are gender (Abdu Raheem, 2012; Adigun, Onihunwa, Irunkhai, Sada & Adesina, 2015; Heo & Toomey, 2020; Otutola, 2017) and learning style (Huang, Luo, Yang, Lu & Chen, 2019; Moussa-Inaty, Atalanta & Causapin, 2019; Surjono, 2015). Studies reveal that there have been stereotypes in issues that relate to gender and learning style of students. For example, Art and languages have been stereotyped over the years as the domain for females while Mathematics, Science and Social Sciences has been stereotyped as that of males. To get rid of this stereotypes and ensure equal academic achievement for both males and females in subjects, Abdu Raheem (2012) suggested that necessary materials/equipment that would make learning interesting and enjoyable be made available to students, and Yukiko (2016) opined that for multimedia instruction to meet both students and teachers' needs, then, instruction should shift from passive, teacher-centred classroom to active student-centred one.

Hence, modern instructors suggested that constructivist and interactive instructional approaches be utilized in classrooms (Pirker & Gütl, 2015). Thus, teachers should not just teach how to recite, but teach how to solve problems and apply the taught methods. To achieve this, Etobro and Fabinu (2017) suggested making subject content of senior secondary school biology curriculum more contemporary, meaningful, and interesting for students. Thus, visualization of concept and processes to better improve students' understanding, through an instructional strategy supported by computer-based multimedia instructions is being suggested.

The term multimedia has been defined in different contexts, depending on the multimedia element used. For example, Mayer (2000), defined Multimedia as the presentation of learning media using both preferential and verbal forms such as spoken and printed texts. Khasawneh (2009) defined multimedia as the "design, implementation, manipulation, storing, and proper delivery of various types of media to interested users" (p. 1). Mukherjee (2018) opined that multimedia should be interactive, it should be controllable by the user.

Worldwide, multimedia is affecting the educational landscape and has been labelled as a tool that can enhance effective and efficient teaching and learning. However, while it is increasingly used in many developed countries in computer-based narrated animations, observations have shown that the use of computer in developing countries such as Nigeria to teach secondary school students is still a thing of novelty. Though studies have shown the importance of computer technologies in education, the place of implementation has posed serious challenges, and appalling performance of students in many subjects, and particularly in the sciences, has been the consequence. Hence, this study considered a change from the conventional method of teaching to a computer-based one, intending to find out the effect of computer-based multimedia instructional packages on students' academic achievement in Biology.

1.1. Literature Review

The study is guided by the Cognitive Theory of Multimedia Learning (CTML) designed by Richard E. Mayer in the 1990s. CTML is a cognition model that attempts to build a meaningful connection between words and pictures. The theory explains that students learn more deeply with a combination of words and pictures than with either words or pictures alone. Based on the theory, multimedia brings about meaningful learning, and meaningful learning can only be said to have been achieved if the learner can apply the knowledge of what he/she has learned in new situations. Principles such as multimedia principles, coherence, personalization, and pre-training principles, amongst others, that add more thought specifically to the construction of presentations are found in the theory (Moreno & Mayer, 2000). These principles are applied in the design of the multimedia instructional packages used in this study.

With the evolution of multimedia in education, learning has gradually moved from the era of the teacher being the repertoire of knowledge or the students being the passive recipients. Now, the role of both teachers and students' have significantly changed. Teachers are now facilitators of learning and students are active participants in the learning process (Oshinaike & Adekunmisi, 2012). Adegoke (2010, 2011) found that learners retain more when a variety of senses are engaged in learning; and that the experience allows them to retain and recall information. Son & Simonian (2016) opined that supplementing traditional teaching classroom with multimedia learning tools could enhance students' motivation to learn, and make them active in the learning process, thereby, improving practice. Likewise, several similar studies have reported the increased academic success of students where multimedia techniques are applied, and this success is attributed to the ability of multimedia technology to capture students interest and get them engaged in the course of learning (Ilhan, & Oruç, 2016; Park et al., 2019; Son & Simonian, 2016). This implies that the mental representation and connections of learning materials in words and pictures enhance students' engagement via active learning (Park et al., 2019). Hence, multimedia, in its many formats, has been found to play a crucial role in education indeed. However, care must be taken when designing multimedia instructions so as not to overload the working memory (Moussa-Inaty et al., 2019).

Also, some studies have shown that learners' cognitive/learning style influences their academic performance. This implies that each individual has a specific way of grasping a particular concept or situation. This specific way of understanding concept or situations is called Learning Style. James and Gardner (1995) defined learning style as the "complex manner in which, and conditions under which, learners most effectively perceive, process, store, and recall what they are attempting to learn" (cited in Hawkar, 2014, p. 241). Several researchers have investigated the effect of learning style on the academic achievement of students. While some studies found a significant effect of learning style on academic achievement, some did not. For example, studies of Bethel-Eke and Eremie (2019) and Magulod (2019) showed learning styles to impact significantly on learning. However, some studies have debunked the notion that learning style has any significant effect on academic performance. For example, Munir, Ahmad, Hussain, and Ghani (2018); and, Huang, et, al. (2019) do not find any significant relationship between learning style and students' academic performance. Also, while some researchers suggest that learning style issues should be taken into consideration when trying to understand how learners learn more effectively (Kirshner, 2017; Knoll et al., 2016), some other researchers believe that instructional designers do not need to necessarily take students preferred learning style into account to facilitate learning, but rather focus on consideration of mental constraints (Moussa-Inaty et al., 2019). Hence, learning style may be an important variable to also consider and experiment in this study.

Gender inequality, particularly in developing countries is not a new phenomenon. It has been a topic that has drawn the concerns of NGOs, stakeholders, educators, amongst others, which has prompted the cry for equality in education for the girl child. United Nations (UN, 2013) opined that achieving gender equality in education means an equal opportunity for both males and females to have equal learning process, equal learning outcome, as well as equality in external results after leaving school. The issue of gender and academic achievement has for a long time remained a controversial one. For instance, while some studies found a significant effect of gender on students' academic achievement (Heo & Toomey, 2020; Otutola, 2017), some did not (Akinoso, 2018; Abidoye, 2015; Adigun et al., 2015; Nnamidi & Oyibe, 2016; Powell, 2004). Some researchers, therefore, concluded that male and female students would perform equally the same if they are exposed to the same type of instructions (Huang et al., 2019; Moussa-Inaty et al., 2019). Therefore, as Calsmith (2007) opined, the influence of gender and differences in academic performance is a complex task, making many studies appear to be contradictory. Hence, while Gender has been linked with the performance of students in several studies, but with no definite conclusion, this study aims to add to the body of literature in the area, and also find out if multimedia instructional packages could help enhance gender equality in the academic achievement of students in Biology.

1.2. Statement of the Problem

Although the benefits of multimedia presentations are well known, they are not too widely used in Nigeria secondary schools. In most schools, the traditional method of teaching in which the teacher is the repertoire of knowledge is still the order of the day, and this method is used to teach even science subjects such as Biology which naturally, is full of abstract concepts and phenomenon. As a result, many students fail the subject at both internal and external examinations level, leading many to lose interest in the subject, believing it is too complex to understand. Several studies have identified the traditional teaching strategy as contributory to this problem. Therefore, there is a need to explore a change in teaching strategy, hence, this study.

1.3. Purpose of the Study

This study aims to investigate the effects of multimedia instructional packages on students' academic achievement in Biology, and also examine the effects of gender and learning style on students' academic achievement.

1.4. Research Questions and Hypotheses

One research question and four hypotheses are investigated in this study.

1.4.1. Research question

R.Q 1: What is the level of students' achievement in Biology when exposed to the treatments?

1.4.2. Research hypothesis

The following null hypotheses are generated and tested at 0.05 level of significance:

H_{01}: There is no significant main effect of treatment on students' academic achievement in Biology.

H_{02}: There is no significant main effect of gender on students' academic achievement in Biology.

H_{03}: There is no significant main effect of learning styles on students' academic performance.

H_{04}: There is no significant interaction effect of treatment, gender and learning styles on students' academic achievement in Biology.

2. Methodology

2.1. Research Design

This study adopts the pre-test, posttest control group experimental design. Simple Random sampling technique was used to select the 80 students that participated in the study. Biology content pre-test was used as a covariate. The design is structured as follows

Experimental Group 1: A1 + Q1 + A2

Experimental Group 2: A1 + Q2 + A2

Control Group: A1 + Q3 + A2

Where

A1 = Pre-test Assessment for experimental and control groups (covariate)

Q1= Treatment: multimedia instructional package 1

Q2 = Treatment: multimedia instructional package 2

Q3 = Conventional (chalk and talk) teaching method

A2 = Post-test assessment for experimental and control groups

Two multimedia instructional packages were designed for the study. The first, MIP 1 was designed with pictures, narrations and onscreen texts. The second, MIP 2 was designed with animations, narrations, onscreen texts and video clips. Topics on cell division: mitosis and meiosis were divided into the duration of six weeks in each package. The packages were validated by two Educational technologists, one test and measurement expert and two Biology teachers.

The experimental group 1 was exposed to MIP I and experimental group II was exposed to MIP II. A user guide was given to the students in the experimental groups ahead of the study to prepare them for the study. The control group was exposed to the conventional "talk and chalk" method. The learning styles of the students were determined through the VAK Learning Style Indicators, adopted from Sanni, K. T. (2014). The teachers in the experimental groups were facilitators, clarifying concepts, answering questions and initiating feedback from students.

2.2. Study Participants

The population for the study consists all students offering Biology as a subject in the senior secondary schools in Ibadan North Local Government Area, Oyo State, Nigeria, from where a sample of 80 students was randomly selected from three secondary schools. The samples were also randomly assigned to three groups (one control and two experimental groups). Table 1 shows the grouping of the participants.

Table 1. *Grouping*

Gender	Control group	Exp. group 1	Exp. group 2
Female	17	13	6
Male	23	8	13
Total	40	21	19

2.3. Research Instrument

The two instruments used in the study are the Biology Achievement Test and the VAK Learning Style Indicators.

The Biology Achievement Test (BAT) consists of 30 multiple-choice questions on Cell Division with four possible answers for each question (A-D). The items were extracted from past questions between the years 2005 and 2015 from West Africa Examination Council (WAEC), a standardized examinations body in West Africa. To ensure further validity of the instrument for the set of students in the study, the face and content validity of the instrument was done. Two Biology teachers, two educational technologists and one expert of test and measurement participated in the validation of the instrument. The BAT was also trial tested on 20 students from two schools not participating in the research to test for its reliability. From the analysis of the students' responses, a reliability coefficient of 0.72 was established using the Kuder-Richardson (KR 20) formula. This implies the instrument was reliable. The BAT was used as the pre-test as well as the post-test.

VAK Learning Style Indicators: VAK Learning Style Indicators (VLSI) was adopted from Sanni, K. T. (2014) for this study. The instrument was originally designed by Chislett and Chapman (2005) and adapted by Sanni, K. T. (2014). The validity and reliability of the instrument in the context of Nigeria secondary schools has been carried out by Sanni, K. T. (2014). The content validity index of the instrument was 0.75 and the reliability coefficient was 0.65 of Chronbach Alpha. Section A of the instrument elicited demographic information of the students such as school name, gender, class and age. Section B consisted of 22-items, each of these items is followed with three statements that represent the learning style preferences of the respondents in terms of visual, auditory and kinesthetic respectively. A three-point scale of "To a large extent" (3), "To a moderate extent" (2), "To a low extent" (1), was used for the respondents to rate the extent to which they prefer the three learning styles.

2.4. Data Analysis

Data collected through the instruments were analyzed using descriptive statistics of mean, standard deviation, frequencies, percentages, ANOVA, T-test for comparison of gender results, and Estimated Marginal Means (EMM) was also used to determine the magnitude and direction of differences among groups.

3. Results

3.1. Answers to the Research Question

R.Q 1: What is the level of students' performance in Biology when exposed to the treatments?

Table 2. *Students' performance based on treatment groups*

Score	Control group	Exp. group I	Exp. group II
0 – 12	20 (50.0)	02 (9.5)	0 (0.0)
13 – 15	07 (17.5)	05 (23.8)	0 (0.0)
16 – 18	09 (22.5)	07 (33.3)	03 (15.8)
19 – 21	04 (10.0)	05 (23.8)	07 (36.8)
22 and above	0 (0.0)	02 (9.5)	09 (47.4)
Total	40	21	19

Table 2 shows the performance of students according to their treatment groups. In the control group, 50% of the students in failed the test, 50% had a credit score, and none of the students had a distinction in the group. However, in the experimental group I, 9.5% of the students failed the test, 80.9% of the students had credit score and 9.5% had distinction. In the experimental group II, none of the students failed the test, 52.6% of the students had credit pass and 47.4% had distinction. This implies that students in the control group have a low level of academic achievement in Biology compared to the other groups. Those in the experimental group I have a high level of academic achievement and those in experimental group II have the highest level of academic achievement amongst the three groups. Figure 1.0 shows the graphical representation of the students' performance in the three groups.
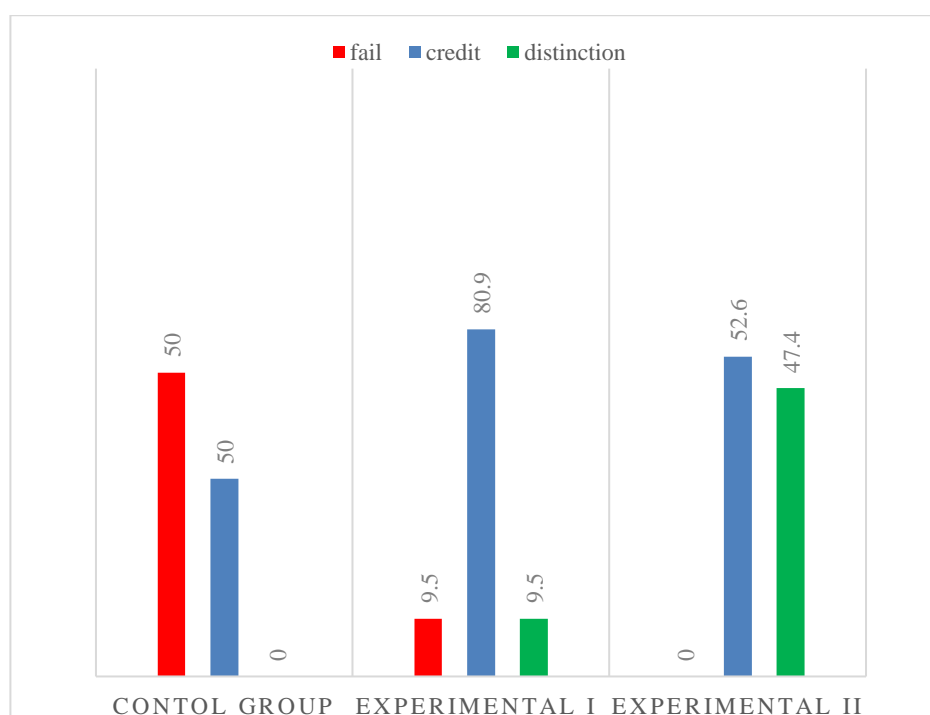

Figure 1. Graphical representation of students' achievement in BAT after treatment

3.2. Testing the Null Hypotheses

Ho₁**:** There is no significant main effect of treatment on students' achievement in Biology.

Table 3. *Tests of between-subjects effects*
  Dependent Variable: postscore

Source	Type III Sum Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	942.247[a]	18	52.347	7.016	.000	.685
Intercept	1387.667	1	1387.667	185.988	.000	.762
prescore	27.249	1	27.249	3.652	.061	.059
trtmt	405.633	2	202.816	27.183	.000	.484
gender	29.591	1	29.591	3.966	.051	.064
learnstyle	5.275	2	2.637	.353	.704	.012
trtmt * gender	74.212	2	37.106	4.973	.010	.146
trtmt * learnstyle	30.130	4	7.533	1.010	.410	.065
gender * learnstyle	39.151	2	19.576	2.624	.081	.083
trtmt * gender learnstyle	69.942	4	17.485	2.344	.065	.139
Error	432.740	58	7.461			
Total	22487.000	77				
Corrected Total	1374.987	76				

a. R Squared = .685 (Adjusted R Squared = .588)

Table 3 shows that there is a significant main effect of treatment on students' achievement in Biology (F (2, 58) = 27.18; P < 0.05; partial eta square = 0.48). Therefore, Ho1 is rejected across the three groups.

Table 4. *Estimated marginal means table*

Variable	Mean	Standard error
Intercept		
Pre score	9.08	-
Post score	17.25	.37
Treatment		
Control	13.14	.55
Experimental Group I	16.68	.65
Experimental Group II	21.94	.93
Gender		
Female	17.98	.54
Male	16.53	.50
Learning styles		
Visual	16.93	.57
Auditory	17.14	.61
Kinesthetic	17.68	.71

Table 4 reveals that students exposed to multimedia instructional package II had the highest mean score (21.94), followed by those exposed to multimedia instructional package I (16.68) while those exposed to conventional strategy scored lowest (13.14). Table 5 shows the source of significance.

Table 5. *Pair wise comparison of the groups using Scheffe's Post Hoc Test*

Treatment	Control group	Exp. group I	Exp. group II
Control group		*	*
Exp. group I	*		*
Exp. group II	*	*	

Table 5 shows that the significant difference exposed by Table 3 was as a result of the significant difference between:

Experimental group II and the experimental group I

Experimental group II and the control group

Experimental group I and the control group

The implication of this is that multimedia instructional package II is significantly better than the multimedia instructional package I, and both multimedia instructional packages I and II are significantly better than conventional teaching method in enhancing students' achievement in Biology

Ho2: There is no significant main effect of gender on students' achievement in Biology.

According to Table 3, gender has no significant main effect on students' performance (F (1, 58) = 3.97; P > 0.05; Partial eta square = 0.06). Therefore, Ho2 is not rejected.

Ho3: There is no significant main effect of learning styles on students' achievement in Biology.

According to Table 3, learning style has no significant main effect on students' performance in Biology (F (2, 58) = 0.35; P > 0.05; partial eta square = 0.01). Therefore, Ho3 is not rejected

Ho4: there is no significant interaction effect of treatment, gender and learning style on students' academic performance in Biology

According to Table 3, there is no significant interaction effect of treatment, gender and learning styles on students' academic performance in Biology (F (4, 58) = 2.34; P > 0.05; partial eta square = 0.14). Therefore, Ho4 is not rejected.

3.3. Discussion and Implication of Findings

The findings of this study revealed that there is a significant difference in the academic The findings of this study revealed that there is a significant difference in the academic achievement of students across the three groups. Biology (F (2, 58) = 27.18; P < 0.05; partial eta square = 0.48). Those exposed to the multimedia instructional packages performed significantly better than those in the control group. The reason for this higher significance might be as a result of the multimedia elements such as animations, narration, on-screen text, pictures amongst others which were used in the design of both packages. This implies that the use of multimedia instructional packages to teach bring about higher academic achievement than the conventional strategy. This finding upholds the assertion of Mayer (2009) that students learn more deeply with words and pictures when combined than they could have with either words alone or pictures alone, and that multimedia is more effective when it is interactive and under the control of the learner. This finding is therefore in line with results of some similar previous studies (Gambari, Yaki, Gana, & Ughovva, 2014; Ilhan, & Oruç, 2016; Park et al., 2019; Saputri & Indriayu, 2018) that using multimedia technique as learning media has positive effects on students learning outcome when compared to the conventional strategy, and that multimedia enhances students learning interest and efficiency. However, while this finding upholds several of Mayer (2001) principles, it does not uphold the redundancy principle which says that students learn better when animation and narration are not combined with printed text.

The higher significance of MIP II could be the result of the short video clips integrated in the package for each topic, which was not found in MIP I. Videos have been found to have the ability to focus users' attention, and provide clarity and explicitness to concepts, which was not possible with words or pictures alone. This is in line with the findings of Brame (2015) and Carmichael, Reid, and Karpicke (2018) that short videos integrated in instruction can improve academic performance of students. Therefore, integrating short videos into multimedia packages can be more compelling than graphics without video.

It was also found that learning style has no significant main effect on students' academic achievement in Biology. (F (2, 58) = 0.35; P > 0.05; partial eta square = 0.01). This implies that students' performance in Biology was independent of their preferred learning styles. This finding is in line with those of Cimermanova (2018); Huang et al. (2019); and Munir et al. (2018) who found that students preferred learning style does not influence learning outcome. Likewise, the result of the metadata analysis done by Ay (2017) revealed that learning types/styles only have a medium-level positive effect on student achievement. However, this finding contradicts those of Bethel-Eke and Eremie (2019); Ezzeldin (2017); and Magulod (2019), all of whom found learning styles to impact significantly on learning, and its behaviour.

An explanation to the insignificant main effect of learning styles on academic achievement seen in this study could be because computer-based multimedia instruction in the country is not commonly experienced by the students, and more specifically in public schools, from where the samples of this study were drawn. Hence, the multimedia elements integrated into

each of the lessons discussed in the experimental groups I and II respectively could have stimulated students' interests by making concepts and phenomenon real, thereby giving them the ability to focus attention, allowing for better understanding, and resulting in a higher positive effect on their academic achievement regardless of their preferred learning styles. Also, another explanation for this effect could be that the students working memory were not overloaded in the course of learning. Hence, as Moussa-Inaty et al. (2019) suggested, instructional designers should focus on designing instructions in such a way that the working memory is not overloaded, and to achieve this, instructions should be broken into units that students can focus attention at a time.

Also, it was found that gender has no significant main effect on students' academic achievement in Biology (F (1, 58) = 3.97; P > 0.05; Partial eta square = 0.06). This implies that the performances of male and female students in the different groups are proportionate. Male students do not perform significantly better than their female counterparts in each of the three groups. This might be because both are exposed to the same type of instruction. This result implies that the cognitive capability of male students is not significantly different from female students. Hence, if students are exposed to the same type of instruction, there is every possibility they will perform the same way. This finding is in line with that of Goni, Yagana, Ali and Bularafa (2015) that there is no significant difference between gender and academic performance of the students they studied, and also in line with some similar previous studies (such as of Abidoye, 2015; Adigun et al., 2015; Akinoso, 2018) that treatment has no significant effect on gender. However, this finding contradicts that of Heo and Toomey (2020) who found gender differences in the academic achievement of undergraduate students they studied, where their male participants performed significantly better than the female participants in all learning tasks, regardless of the type of multimedia used. This finding also contradicts that of Abdu Raheem, (2012) that males perform better than females in mathematics, science and social sciences, and that of Otutola (2017) that female students performed significantly better than males in WASSCE multiple-choice Biology test.

4. Conclusion, Recommendations and Suggestions

4.1. Conclusion

The findings of this study revealed that computer-based multimedia instructional packages can bring about meaningful learning and improved academic achievement in Biology. Therefore, it is concluded that multimedia instructional packages be utilized in secondary schools for improved academic achievement in Biology.

4.2. Recommendations

The following recommendations are made from the result of the study:

i. The federal government should invest in the acquisition of computers, and a well-prepared computer laboratory in her secondary schools.
ii. School administrators should be oriented about the benefits of using multimedia packages in teaching their students.
iii. Seminars should be done for in-service teachers on how to design, develop and utilize multimedia instructional packages.
iv. Both in-service and preservice teachers should be trained on how to use multimedia instructional packages.

4.3. Challenges Encountered in the Course of the Study

Lack of computers/poor state of computers in schools: many of the schools surveyed in the course of the study do not have computer laboratories. Some of the schools that have computers have very few functioning ones/in good and useable states. Therefore, the researcher has to go with some laptops to supplement the available ones in the selected schools for personalized instruction to be possible. This also accounts for the small sample size of the experimental groups.

4.4. Suggestions for Future Studies

The following suggestions for future studies are made:
i. More studies could be done on the effect of learning styles on students' academic achievement. Grouping could be done on preferred learning styles, and instructions could be designed to match each group. Result of such study could be compared with those of mismatched groups and with studies like this.
ii. The study should be replicated in different geo-political zones in the country.
iii. More studies should be carried out that spans across more secondary schools and the result could be compared.
iv. Studies on inhibitors to multimedia learning could also be pursued.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE NATURE AND POTENTIAL OF DIGITAL COLLABORATIVE READING PRACTICES FOR DEVELOPING ENGLISH AS A FOREIGN LANGUAGE

Research Article

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THE NATURE AND POTENTIAL OF DIGITAL COLLABORATIVE READING PRACTICES FOR DEVELOPING EFL PROFICIENCY

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Abstract

This study investigates the integration of a digital annotation tool (DAT) into an advanced English as a foreign language reading course. Informed by the recent research, the goals of the study are to exhibit the nature of L2 learners' engagement in digital social reading practices and illustrate the linguistic benefits of such practices for L2 learning from a learner perspective. In response to these objectives, a mixed-method research was employed. The analysis of the data including digital annotations and learners' reflection journals reveal that learners' engagement within collaborative reading environments is linked to factors such as the quality of posts rather than the quantity. In terms of perceived linguistic gains, the findings indicate that digital collaborative reading enabled learners to achieve a perceived development in reading, writing, and vocabulary. The study concludes by suggesting further research to examine the use of DAT in L2 teaching and learning settings, which highlight the extent of factors influencing L2 learners' engagement in digital social reading practices.

Keywords: Digital collaborative reading, English as a foreign language, digital literacies

1. Introduction

The development in information and communication technologies presented many opportunities for individuals to take part in technology-enhanced interactions, which can be leveraged in ways to create pedagogical spaces for language learners to engage in socio-interactive literacy practices (Kessler, 2018). Such diverse and complex literacies are afforded by mediums including digital annotation tools (DATs), which offer spaces for individuals to discuss various aspects of a multitude of texts through synchronous or asynchronous multimedia-enhanced contributions. This type of multi-layered reading practice is commonly referred as digital social reading (DSR). A typical DSR practice entails annotating a text uploaded via a DAT as text itself becomes the meeting space, which "highlights the virtual nature of social reading, an activity that is shared, yet spatially and cognitively distributed" (Blyth, 2014, p. 209). Thus, it has the potential to create formal and informal opportunities for learners to have access to texts within multimedia-rich environments featuring instructor or learner-provided within-reading supports (i.e., annotations). The research investigating digital social reading environments and literacies in both higher education settings in general (e.g., Sun & Gao, 2017) and second language teaching and learning contexts in particular (e.g., Thoms, Sung, & Poole, 2017) revealed that DATs could function as alternative pedagogical spaces affording various types of online interactions and opportunities for facilitating L2 learners' linguistic and social gains.

Despite a growing body of scholarship, further examination is needed to gain a deeper understanding of the nature of language learners' digital collaborative reading practices and students' reflections on their social reading experiences. The present study explores the nature of learner interactions mediated by a DAT and learners' perspectives on linguistic benefits of DSR practices in a tertiary-level advanced EFL reading course. The study aims to

contribute to the literature on the use of DAT for language teaching and learning purposes through the adoption of a DAT in the underexplored Turkish higher education context.

2. Literature Review

Literature has abounded in studies that have attempted to analyze the use of digital annotation tools (DATs) in higher education contexts. This body of research reveals DATs serving different roles in different instructional activities including the promotion of reading comprehension, meta-cognitive skills, critical analysis, and cultivating interactions between students-students and students-instructors (Novak, Razzouk, & Johnson, 2012; Sun & Gao, 2017). However, these studies were carried out in first language (L1) contexts and did not involve activities featuring the use and development of any second language (L2). The studies exclusively dealing with the use of DATs in second language teaching and learning (L2TL) environments are more recent and relatively more limited despite a growing body of literature.

Preliminary work explored the efficiency of DATs compared to print-based texts and other digital tools, which cannot be annotated (e.g., e-mail, instant messenger). In English as a Foreign Language (EFL) contexts, Yang, Zhang, Su, and Tsai (2011), and Lo, Yeh, and Sung (2013) run tests to compare an experimental group of learners engaging in collaborative reading practices with a control group of students, who used other types of digital tools without annotation features or the same tool in a read-only mode. Experiment groups were found to achieve much higher scores in both of the studies, thus demonstrating an increase in L2 learners' reading comprehension. Examining the annotations of 50 EFL students, Tseng, Yeh, and Yang (2015) found that frequently used annotations were marking vocabulary, adding Chinese (L1) notes to unknown vocabulary, marking text information, and adding summary notes to each paragraph. Among those, marking text information and adding summary notes were the main annotations that fostered learners' reading comprehension. Finally, in a series of recent studies, Yeh, Hung, and Chiang (2017) and Tseng and Yeh (2018) investigated EFL learners' reading comprehension levels by adopting Reciprocal Teaching (RT), an instructional framework as part of which learners undertake the role of teacher for collaborative construction of their understanding of texts. Pre- and post-reading comprehension tests in both studies indicated that the intervention of DAT helped learners enhance their reading comprehension. It is important to underscore here that the above-cited research was almost exclusively carried out in East Asian settings, where from lower to intermediate levels of EFL learners took part as participants.

Blyth's (2014) multiple-case study constituted an early attempt to explore pedagogical benefits of integrating a DAT (eComma) into teaching in a North American context. Investigating teachers' understanding of L2 literacy instruction through eComma in both undergraduate and graduate contexts, he concluded that eComma provided access to different types of digital reading, enabled learners to create a network, from which less expert readers benefited mostly, and allowed teachers to synthesize several activities (i.e., pre-reading, reading, post-reading) into a single activity (i.e., reading) in the medium. More recently, Thoms and Poole (2017, 2018) analyzed learners' interactions through a DAT in an advanced Spanish poetry course. Taking an ecological perspective in the first study, the researchers demonstrated that advanced learners had more social- or literary-related annotations compared to linguistic comments. Conducting another study in the same context, Thoms and Poole (2018) showed that the higher lexical diversity of texts (i.e., poems) led to a decrease in learners' annotations consisting of literary affordances. In other words, the study provided empirical evidence, which indicated that the factors not related to learners, such as text difficulty, could facilitate or limit certain types of affordances in digital reading spaces.

Thoms et al. (2017) examined the pedagogical and linguistic benefits of using a DAT in an undergraduate lower-level Chinese language class, in which learners read and commented on short stories written in Chinese characters over a two-week period. The results illustrated how learners interacted through inquiries for meaning of both vocabulary and Chinese characters while co-constructing meaning and scaffolding their learning in a digital environment. Finally, Solmaz (2020) investigated the role of a DAT in L2 socialization of EFL learners in a university-level reading class and found that students successfully socialized into various genres and communities by engaging in both expert and novice performances.

The perceptions and attitudes of learners and instructors in digital collaborative reading research has been explored by a number of authors (e.g., Blyth 2014, Lo, Yeh, & Sung, 2013). Participants engaging in social reading activities generally responded positively to DAT systems, with respect to perceived usefulness and ease of use, attitudes to share knowledge, thinking skills (Chang & Hsu, 2011; Lo et al., 2013; Yang et al., 2011) while reporting challenges such as frustrations with certain technical aspects of DATs, the difficulty of making distinct annotations to avoid repetition, existing comments impeding learners' understanding of texts (Thoms & Poole, 2017; Thoms et al., 2017). On the other hand, instructors were often reported to have favorable opinions about the incorporation of DATs into formal contexts despite a number of technical drawbacks (Blyth, 2014; Thoms & Poole, 2017).

A recently emerging strand of research concentrated on the use of digital collaborative reading systems for the professional development of L2 teachers. Michelson and Dupuy (2018) investigated six novice L2 teaching assistants' (TAs) academic literature discussions carried out in a DAT setting concurrent to a face-to-face methods course. The findings revealed that the experience enhanced teacher dialogues among L2 French teachers, and enabled them to co-construct an advanced conceptual knowledge of multiliteracies pedagogies.

In sum, the potential of DATs to facilitate social reading has been explored through a series of studies, which provide insight into the state of digital collaborative reading in L2TL contexts. However, further research is needed to understand the dynamic nature of L2 learners' socio-literacy practices and interactions in DAT systems, and to what extent their beliefs and practices align with the research on social and linguistic benefits of digital collaborative reading. Thus, the present study aims to fill a gap in the literature by attempting to address these research questions: 1) What is the nature of L2 learners' engagement in digital literacy practices when participating in social reading by means of a digital annotation tool?; 2) What are the linguistic benefits of digital social reading practices for L2 learning from a student perspective?

3. Method

3.1. Participants and Context

The present study was conducted as part of an advanced-level undergraduate reading course offered in the second year of coursework at the department of English Language Teaching (ELT) at a university in Turkey. The study is part of a larger research project in which the same data-set was investigated through a different research question guided by the theoretical lens of socialization (see Solmaz, 2020). 12 students (9 females, 3 males), who were aged between 19-23 years old, participated in the present study. Majority of the students were able to access and use the internet regularly and had previous experience with the use of

technology for developing their language skills. The instructor of the course was the author, who had several years of experience in teaching at undergraduate ELT courses and had previously taught Advanced Reading courses.

The elective course required 2-hour meetings per week and aimed to support upper-intermediate English learners' development of reading skills by introducing them to a multitude of genres and various reading strategies. While the first six weeks of the course was centered more on theoretical aspects and required active presence of the instructor, the second part of eight-week period involved students uploading texts in various genres, and leading discussions in their respective groups. During the second part of the course, the instructor assisted learners to familiarize themselves with the use of digital annotation tool (DAT) through a text he uploaded and annotated for the first week. Later, students formed groups consisting of 3 to 5 members and each member found a text in a pre-determined genre, uploaded it to the DAT, annotated it (see Appendix for sample annotations) and led the online discussions evolving around annotations added by themselves and group members. Finally, students engaged in a similar activity for the final assignment (weeks 6-8) although they were able to select a text in the genre of their own choice. For this period, students were encouraged to participate in the discussions occurring in non-group members' texts as well. The students had a period of one week for the preparation of their texts and approximately ten days for the participation in other discussions. Following the end of activities, students were required to write a two to three-page journal, in which they reflected on their digital collaborative reading experiences. This pedagogical approach allowed both the teacher and the students to engage in face-to-face and online conversations to explore the various aspects of the text throughout the semester.

3.2. Digital Annotation Tool

For the present study, the participants used *SocialBook*, a free digital annotation tool which allows readers to engage in a variety of activities before, during, and after reading (Figure 1). Although the platform is still a work in progress, it offers access to a multitude of texts and enables users to upload their own materials as well. Individuals can upload a text and form a group around the document through inviting others. These texts can be annotated through commenting, underlining, and integrating multimedia resources such as uploading images or inserting links. Thanks to the digitally annotated documents by users, individuals can carry out conversations through threaded discussions. These threads are often formed as a result of certain parts of the text being annotated by users, thus resulting in a multi-layered discussion. Depending on the preference, these threaded conversations can be asynchronously led by either instructor or students in a pedagogical context. As is in the current research, students can upload texts, invite their classmates, and lead an online conversation, which is not constrained by time or space. Since the time and date stamps are automatically recorded, the instructor can follow the activities of the participants on the text. Despite the availability of several other annotation tools adopted in L2 research (e.g., eComma in Thoms et al., 2017; Hylighter in Thoms & Poole, 2017), *SocialBook* was selected for this study because the researcher had previous pedagogical experiences with the tool. He observed that a different group of students had positively engaged in using the medium in a different educational context. In addition, prior research employing *SocialBook* empirically in a language learning context was not present at the time of research design.
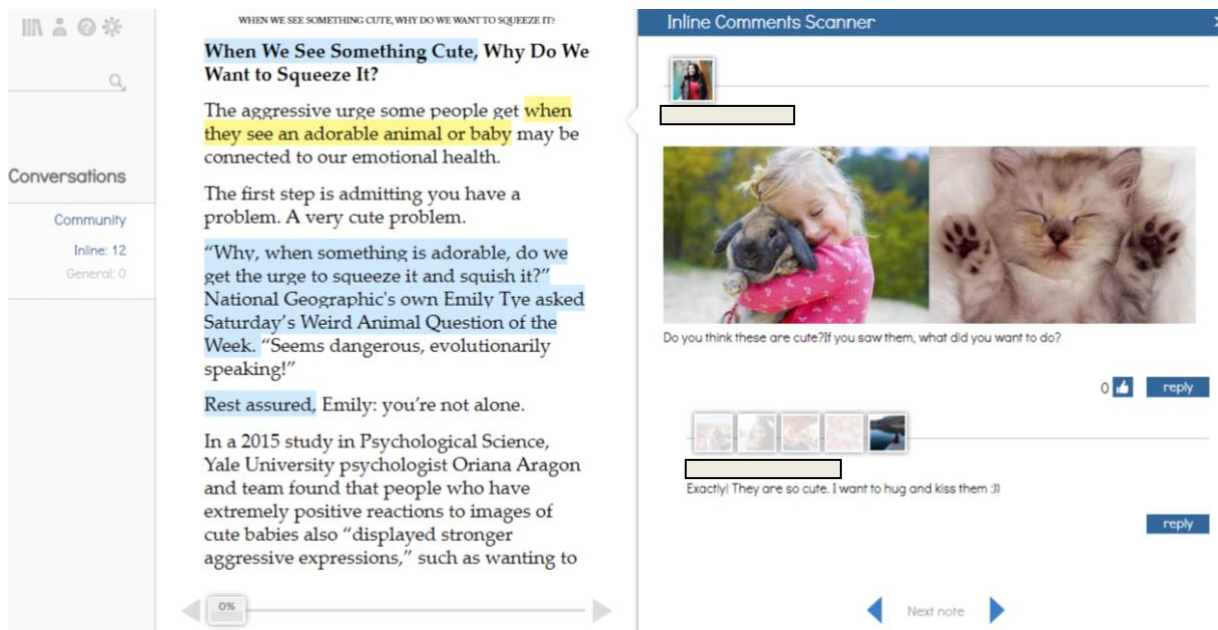
Figure 1. The Interface of SocialBook

3.3. Data Collection and Analysis

The present study utilizes a mixed methods approach by employing data sources which include a pre-study survey, annotations placed in the DAT, and learners' reflection journals. The survey aimed to illustrate a demographic picture of the learners and included questions to learn more about the individual's previous experiences of L2 learning with the assistance of web technologies, and whether they could access computer and internet at the place they live in. The second source of the data featured digital comments annotated by the instructor and participants during the activities. The collected data was quantitatively analyzed based on various indicators including the presence of multimedia or vocabulary-related discussions across the annotations as well as values such as mean values for discussion posts in the final project period. In an effort to understand the nature of students' participations and observe patterns regarding similarities and differences across their annotations, the data was analyzed by two main types of annotations: Initial Posts (IPs) and Response Posts (RPs). IPs were defined as the first posts which start or set a tone for the discussion of a specific part of the post. These posts often consisted of questions eliciting responses or comments from the participants *(e.g., What does the expression 'branch out' mean?)*. RPs were taken as responses to initial posts emerging as part of the discussions across the texts. These posts were often in the form of responses to the directed questions *(e.g., It is to have an interest in something and growing it after realizing about it),* comments providing further insight to the discussion *(e.g., For example, knowing vocabulary may make it easy to branch out to speaking skill),* or links to external resources and multimedia *(e.g., check the link to see the trailer for one of his movies).* The statistical analysis of IPs and RPs constituted the quantitative part of the present investigation, the results of which allowed the researcher to answer the first research question regarding the nature of L2 learners' engagement in collaborative literacy practices through a DAT.

Learners' reflection journals and posts on DAT constituted the qualitative data. Reflection journals were particularly valuable as it served the purpose of gaining insight towards learners' experiences related to digital collaborative reading practices and their reflections towards the value of DAT systems as a pedagogical medium and its use for the purpose of

developing various language skills. Thematic analysis, in which "the researcher focuses analytical techniques on searching through the data for themes and patterns" (Glesne, 2011, p. 187), was adopted for the qualitative analysis of reflection journals. The data was thoroughly read for the purpose of understanding the core of the journals. Later, a set of themes were formed following the coding of ideas emerging from students' comments featuring information regarding their experiences of DAT use, which was a result of "a progressive process of sorting and defining and defining and sorting" (p. 194). The data-driven coding process involved division and sub-division of categories through the analysis process as relevant patterns for each category were identified. These categories were harmonized with themes set for each language skill or area in accordance with the second research question of the study. The main theme emerging across learner journals was the ways they perceived the role of digital social reading practices in developing English language proficiency. Although multiple language areas and skills were mentioned across the journals by different students, the development of L2 literacies including reading, writing, and vocabulary were the most frequently reported areas by a more comprehensive group of participants. Therefore these language areas were taken as sub-categories of the main theme in the data analysis. Following this stage of inductive coding, learners' digital annotations were analyzed through the emerging categories for the purpose of identifying illustrative examples. The goal was to document and demonstrate the examples of learner experiences by providing further insight into the ways DAT might have contributed to the development of the aforementioned language areas (e.g., annotating the text through integrating images as a means of a within-reading support). Further statistical analyses were also conducted to investigate the annotation practices of learners towards developing a particular area such as vocabulary. Overall, the purpose was to examine the complete data in a way to enhance the quality of the findings of the study by providing a comprehensive support to quantitative results.

4. Results and Discussion

The results of the study are discussed based on the research questions that guided the present examination.

4.1. The Nature of English Learners' Engagement in Digital Collaborative Practices

The participants' discussion posts in digital social reading environment were quantitatively analyzed for the purpose of addressing the first research question. The first analysis was conducted to see the weekly participation rates of the instructor and the students (Table 1). Week 1 represents the initial week in which the text was annotated and uploaded by the instructor while Weeks of 2 to 5 reflect the conversations emerging in student-led group discussions. Finally, Week 6 illustrates the total participation rates of students in the texts prepared for the final projects. The data show that students' post numbers were trending upward through the project while it was trending downward for the instructor. These results may be attributed to the fact that following the active instructor intervention in the first two weeks, students developed familiarity with the medium and the tasks, which increased their participation rates. The qualitative analysis of reflection journals revealed data supporting the argument above. Such overt instruction activities are critical components according to Multiliteracies Pedagogy (New London Group, 1996) since individuals learn to recognize connections between form and meaning, and gain insight towards understanding how texts are formed, and how ideas are represented (Warner & Dupuy, 2018).

Table 1. *Total number of comments / annotations by the instructor and participants*

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Total
Instructor	30	29	19	16	8	11	113
Participants	51	128	197	225	222	267	1090
Total Posts	81	157	216	241	230	278	1203

A detailed quantitative analysis exploring the nature of the participants' engagement was conducted to gain further insight as well. The students' comments in the first five-week period, which were categorized as Initial Posts (IP) and Response Posts (RP), were statistically analyzed for each individual (Figure 2). The goal was to see the potential differences across the roles of students as leading a discussion and being involved in a conversation. The data clearly show that (a) L2 learners displayed engagement mostly through RPs (M=12,06) rather than IPs (M=3,06), (b) there were individual differences in the engagement rates although the students' RPs were always higher than their IPs, and c) while the average number of IPs by participants were nearly identical, the average RP rates displayed more variety among the students. The statistical outcome between the number of RPs and IPs is to say that each IP nearly prompted 4 RPs. Considering each group featured 4 members in average, this finding is not surprising. It seems that students tried to respond to each IP annotated in the texts. Since students were mainly responsible for leading the discussion in their own texts, they naturally started the conversations through IPs. Although not reflected in the figure, a dominant majority of all the students' IPs were placed in their texts. This also explains the balanced engagement rates of participants via IPs as shown in Figure 2. The higher fluctuation patterns across RPs might be associated with individual differences. However, in this case, it might also be related to the students' performances as a discussion leader in their texts as not all the students followed up (i.e., responding to them) other group members' RPs on their IPs.
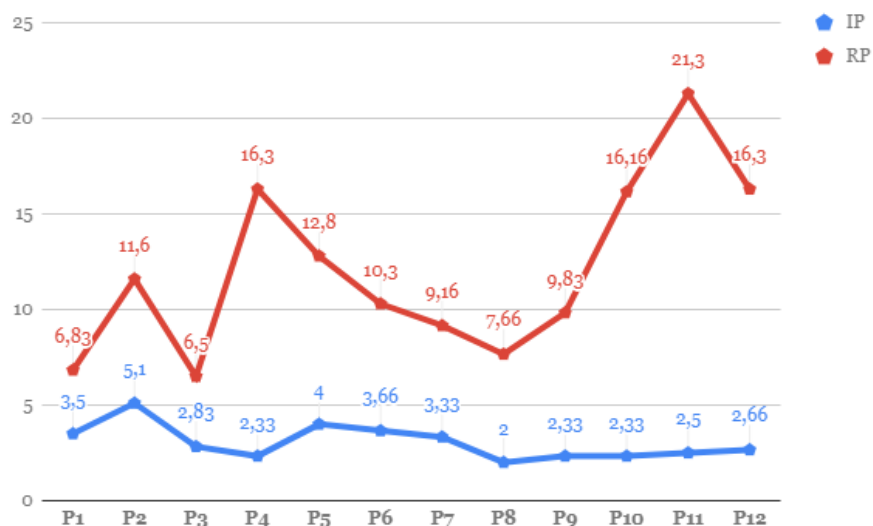

Figure 2. A comparison of participants' initial posts (IP) and response posts (RP) for the five-week period

The statistical analysis was also run for the participants' IPs and RPs for the final project period (Figure 3). The purpose was to draw a comparison between the outcomes of five-week and final project periods in terms of the emerging patterns. The results indicated

that students exhibited more engagement through RPs (M=11,4) rather than IPs (M=3,77), which is similar to the findings from the five-week period. Despite the fact that IP rates were higher for almost all of the participants during the final project, it was observed that most of these posts were in their own texts as in the earlier weeks. It might be speculated that students might not have felt comfortable in engaging in their classmates' texts through IPs as they might have felt that they could potentially pose a threat to the text ownership of group leaders. It might also be associated with the fact that students might not have felt responsible enough to participate in other texts through IPs. Unfortunately, the journal data did not reveal any insights about this particular observation.
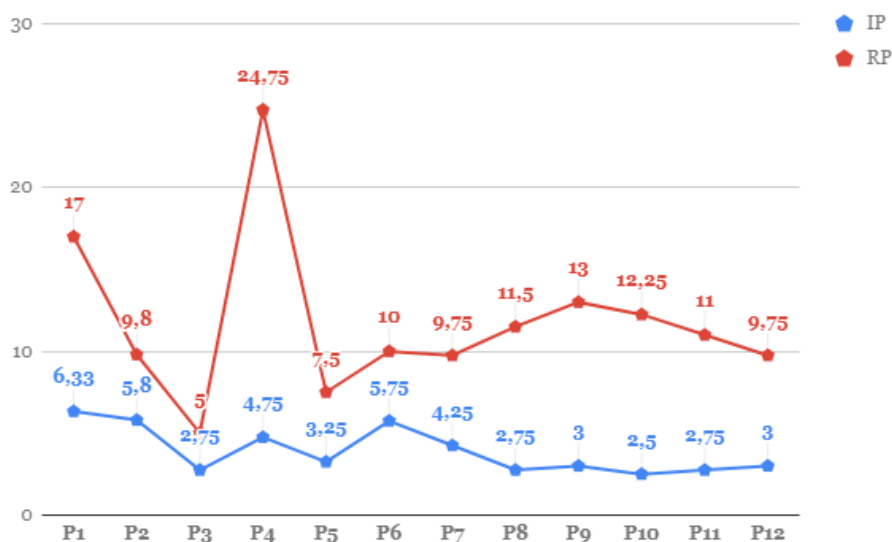

Figure 3. A comparison of participants' initial posts (IP) and response posts (RP) for the final project period

Given the fact that the study aims to investigate the nature of student engagement in digital social reading platform, an in-depth participant and text-based analysis was statistically performed for students' activities during the final project period as well. The investigation of the final project texts was important also because there might be differences observed across the nature of learners' participation since they were encouraged to participate in non-group members' texts as well.

The results represented through Table 2 demonstrate further insight regarding the engagement of learners in texts formed by means of digital tools. The findings hint that higher number of participants in a text does not always guarantee an increased engagement rate. Apart from Text 7, which featured the most participants (n=7) and the highest RP mean values, the texts in which more participants are involved (e.g., Text 7) did not have higher RP mean values compared to the majority of texts with lower number of participants. Previous research investigating the effects of group size found that groups of two to four people were ideal for collaborative learning through digital annotation systems (Chang & Hsu, 2011). The present study, however, shows that factors other than group size might be more determinant to the success of a collaborative reading experience although it might be suggested that there should be at least 3 members in groups formed in similar pedagogical contexts.

The Table also provides further insight regarding the potential role of IPs in the engagement of the participants. As seen in Text 6, higher IP rate does not always generate a high RP. Examining the relationship between IP and RP mean values of the texts, we observe

that IPs created more RPs per individuals in Texts 4 and 8, while higher number of IPs in Texts 12 and 3 could not achieve a similar outcome.

Table 2. *Statistical values regarding the discussion posts in the final project period*

	Number of Participants	IP	RP	Mean value for RP
Text 4	7	20	142	20,28
Text 8	5	11	68	13,6
Text 1	4	18	51	12,75
Text 2	3	28	38	12,6
Text 9	6	12	66	11
Text 5	3	13	31	10,33
Text 6	2	23	20	10
Text 10	4	10	38	9,5
Text 11	4	11	36	9
Text 7	6	17	49	8,16
Text 12	2	12	10	5
Text 3	2	12	9	4,5

Overall, although it is claimed that digital annotation technologies positively affect learner participation and engagement (Novak et al., 2012), it remains unclear to which degree the higher engagement rates can be attributed to the number of participants or IPs by group leaders. However, these findings support the notion that nature of participants' engagement may be influenced by the quality of IPs and the leader, the topic appealing to the interests of participants, and learners' willingness and not necessarily simply by the number of participants.

4.2. The Linguistic Benefits of Digital Collaborative Practices from Learner Perspective

A recurring major theme in participants' reflection journals was how they perceived the role of digital social reading experience in the development of L2 literacies such as reading and writing along with vocabulary. The journals revealed that, a) all participants believed that the experience was beneficial for reading, b) most students think that the tool helps them with both writing and vocabulary in addition to reading, c) a quarter of the students hold the opinion that the experience contributes all three language areas, which is best evidenced by one of the students' comments:

> *SocialBook helps me develop my reading skills; and if my reading skills develops, my writing skills also will develop, because they are connected to each other. It is also useful for building vocabulary. I cannot understand a text without understanding the words I am reading. If I read and understand the words in a text, my reading comprehension skills will be better (P9).*

Many students articulated the value of using a digital social reading tool for developing L2 reading comprehension as they were required to spend more time with(in) the text, which allowed them to explore issues beyond the text, thus providing a comprehensive experience.

Learners were also exposed to within-reading supports through annotations which assisted them in comprehending the text. The employment of multimedia particularly seemed to contribute to learners' engagement with the text (Figure 5).

Figure 5. Learner annotation featuring an image as a means of a within-reading support

Annotating an excerpt from Shakespeare's Romeo and Juliet as seen above, a discussion leader incorporated an image depicting the characters in the play, which might have helped learners to follow the storyline better. Such annotations functioning as within-reading supports allowed learners to engage in a more comprehensive reading experience, through which they were able to explore certain sections of the text in detail as well. Pointing out to the importance of concentrating on particular parts of the text, one participant reflected:

> *When we read texts on SocialBook, we focused on important points in texts. Therefore, we easily understood what text was about and what the main idea of the text was. Also, we emphasized abstract aspects of texts. This enabled us to get extra information about texts (P1).*

The excerpt below, for instance, demonstrates that a discussion leader draws attention to a particular word possessing an underlying meaning in the text. Eliciting similar utterances from different participants, the annotation exemplifies how learners can focus on specific parts of the text including abstract notions and concepts. As expressed by the participant above and illustrated in the excerpt, emphasizing multiple aspects of texts and extending the discussions may positively facilitate learners' reading comprehension and assist them in reaching further context-relevant information. Similar findings were previously documented in L1 (Sun & Gao, 2017) and L2 settings (Lo et al., 2013). However, it is important to underscore that proficiency level of learners and the course itself might have an impact on linguistic benefits of L2 collaborative reading and reading comprehension in general. For instance, while the majority of upper-intermediate level students' annotated comments were primarily social and/or linguistic in a reading-centered course, learners in advanced Spanish poetry class in the study of Thoms and Poole (2017) mainly engaged with their colleagues about social and literary-related issues.

Excerpt 1.

P11: [Highlighted area: "The treasure buried; the room…"] What can the treasure be in this context? Is it a financial item or an abstract item? Just make a guess :)

P9: I don't know why but the story makes me think that the treasure may be abstract.

P11: hmm actually your prediction is true ☐ Also, we can support ur prediction by reading the last paragraph of the text. ☐

P12: I think it is an abstract item. But, I am not sure about it ;)

P11: that is true 👆

P10: I think that it is an abstract item.

P11: 👆 👆 right.

Another benefit indicated by participants was about writing, which was often mentioned along with reading as the platform was recognized as a space combining both literacies. One student stated that annotating the text either as group leader or participant created opportunities to practice their writing, while another student expressed that being engaged in various types of writings was valuable for the improvement of their L2 literacies. As foreseen by Thoms et al. (2017), the experience afforded learners to produce L2 writing while contributing to the development of their L2 reading skills. Some students thought that the casual and relatively informal nature of the platform positively contributed to their L2 writing performances. For example, P10 commented: "You can write what you think or what you want without any restrictions since it is not a very formal page." In addition to the fact that the informal nature of environment resembled their digital quotidian experiences, the asynchronous nature of the tool allowed learners to create an individual timeline for their engagement in the texts within the time frame allotted to them. They evaluated the permanency (i.e., long-term accessibility) of their texts and comments as something positive from which they could ultimately benefit a lot. This was perhaps best evidenced in a student's reflection:

> *Your answers and comments are never lost if you save your reply after answering a question. So, you don't have to complete your whole passage in the same day. You can also answer some questions the following day or after a week, a month, even a year (P4).*

While students' initiated posts naturally created a space for their peers to practice their writing skills, some participants posted annotations explicitly offering such opportunities. For instance, some annotations were constructed as pre-reading activities encouraging learners to speculate about the plot and suggest alternative titles for the story (e.g., *What do you understand from the title of the story? is it suitable for the story? Can you write some interesting titles? -P7, Week 4*) while learners were also expected to complete a given sentence, which is a controlled writing activity developed as part of on-reading activity *(e.g., The Downs means that …………………………. Describe it in your own sentences. -P11, Week 4).*

For most students, even though the tool was reading-centered, they did not see the platform merely as a space for practicing reading and writing; rather, the process enabled them to identify unknown words, idioms, sentence structures, and attach meaning to them. One student summarized the process: "When you highlight unknown words for your audience, they will learn their meanings through the questions you ask them". The instances of such highlighted words consisted of approximately 17% of all initiated posts, meaning that

learners were exposed to nearly 3 vocabulary-related annotations posted by discussion leaders (Table 3). There was only a small difference in the frequency of embedded vocabulary across initiated annotations of five-week period and final projects.

Table 3. *Vocabulary-related initiated posts by the participants*

	Five-week period	Final project period	Mean
Total number of IPs	204	178	191
Vocabulary-related IPs	32	33	32,5
Percentage	15,68	18,54	17,11

There were different types of vocabulary-related annotations, some of which included only a definition, explanation or an image depicting the target word, while others consisted of combinations such as a definition accompanied by an image or a definition followed by a relevant question. One of the questions, for example, required learners to use the target word in a sample sentence as in the post provided by Participant 8: "What does this expression mean? Could you make an example by using it?" Although it was not common, some students incorporated vocabulary-related annotations to the texts directed by their peers. In one of those cases, one student (P1) wrote the following annotation after highlighting the target word: "I didn't know the meaning of anticlimactic, so I wondered and checked it. It means anything connected with turning out to be far less meaningful or exciting than was hoped (Week 3, Obama arrives in Kenya)." The analysis of reflection journals revealed that such within-reading vocabulary support provided by either discussion leader or participants were viewed favorably by learners. Specifying the need to accommodate a variety of learning styles, one participant commented on one of the benefits:

> *You can upload some pictures showing your sentences or words. Students can learn them easily by this way. For example; some learners like me associate words with pictures and they can memorize vocabulary faster (P12).*

Learners in prior studies reported similar experiences, which featured illustrations of L2 grammar and vocabulary-related scaffolding assistance in their respective communities (Blyth, 2014; Thoms et al., 2017). Such within-reading supports might contribute to students' learning experiences resulting in higher achievements. Previous research examining the role of computer-mediated text glosses / dictionaries on L2 reading comprehension revealed that learners accessing to such glosses performed consistently better than those without such support (Abraham, 2008) and they learned more words and had greater vocabulary retention (Li, 2010). Furthermore, DATs allow instructors to visualize and understand not only the problematic vocabulary for learners or but also the ones stimulating more interaction. As a result, the instructor can address these lexical issues in the face-to-face portion of the class, which is another benefit of DATs. Finally, the engagement of the class in multiple discussions based on vocabulary or other types of annotations are important since group collaboration fosters high-level cognitive and metacognitive learning (Li, Pow, & Cheung, 2015).

Together all of the examples above illustrate the diversity of opinions that students shared towards improving L2 literacies through collaborative annotated reading, which functioned as a platform for them to exploit opportunities for linguistic practices and exposure to a rich variety of texts.

5. Conclusion

In conclusion, the present study reveals that among the factors influencing the nature of learners' engagement within digital social reading environments are the discussion leader and

the quality of their initial annotations rather than the quantity, learners' willingness and motivation levels as well as their interest in the topics discussed. However, it is yet to be uncovered to which degree the higher participation rates can be associated with each of these factors. Furthermore, it is shown that the digital space provides a valuable venue for learners by allowing for additional practice with reading and writing abilities as well as exposure to a variety of L2 vocabulary, which possibly went beyond what they could achieve in traditional EFL classroom featuring similar L2 texts. Therefore, it is recommended for language educators to maximize the pedagogical potential of digital social reading tools in language teaching and learning contexts. The integration of collaborative reading spaces into classrooms could be particularly useful when the medium is employed as a supplemental context for learners to engage in practicing multiple L2 skills through well-structured tasks. It is also important to design collaborative reading activities by recognizing the potential role of learners' motivation levels, their willingness, and the degree of teacher presence for a successful learning experience. Furthermore, the pedagogical model followed as part of the present study (e.g., spending the first week for learners to familiarize themselves with the DAT, providing relatively more structured tasks before giving them freedom to bring their own texts from the web) could assist learners to develop an agency as they are expected to take more control of their learning throughout the process. Finally, as previous research indicated (e.g., Solmaz, 2020), DATs can be integrated into both general and skill-based language courses as learners can socialize through engaging in collaborative socio-literacy practices.

Regarding the scholarship, the study makes a value-added contribution to the literature by; a) examining and illustrating the role of certain factors on L2 learners' participation in digital social reading activities, b) detailing the potential of EFL learners' collaborative reading practices for linguistic development from learn perspective, and c) investigating the integration of DAT tool for L2 learning purposes in an underexplored context. However, a number of limitations of the study should be acknowledged as well. First, it did not measure participants' overall learning performances. The relationship between the incorporation of a DAT and students' learning outcomes might have revealed further insight into understanding whether and how annotations contribute to learners' overall L2 proficiency. Secondly, small sample size of the study and the lack of focal student interviews might affect the generalization of the findings for other EFL contexts and the overall strength of the arguments presented. Finally, drawing learners' data automatically from *SocialBook* system was not possible at the time of data analysis, which created a major challenge during the process of data collection and analysis.

Despite the increasing number of research on the use of digital social reading tools for L2 teaching and learning purposes, empirical work has yet to investigate DATs' potential for its successful integration into L2 classes for various language skills in multiple contexts featuring populations such as learners of less commonly taught languages and EFL learners at high school.

Appendix. A participant's initial posts for a text about Michael Jackson.

1. What is the meaning of the verb "debut" here?
2. Can you give examples of famous people who broke down racial barriers?
3. How has he become a dominant figure in music?
4. Why is M.J. very well-known around the world?
5. Do you know the song "Man in the Mirror"? What is it about?
6. What is a public memorial service?
7. Why did his appearance change in his life?

8. Do you know any allegations about M.J.? Do you believe in them? Why or Why not?
9. What do you think about his death? Was it a murder?

6. Conflict of Interest

The author declares that there is no conflict of interest.

7. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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AN ANALYSIS OF MATHEMATICAL COMMUNICATION SKILLS OF THE STUDENTS AT GRADE VII OF A JUNIOR HIGH SCHOOL

Research Article

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Abstract

The study aims at (1) describing the mathematical communication at class VII junior high school in solving problems of the system of equations and linear inequalities of one variable, (2) analyzing the factors that cause students to correct problems in system material and linear inequalities of one variable. The data were collected in the form of text, images and words. The study adopted the descriptive research design based on qualitative data collected from the participants who were selected using purposive sampling model. Subjects were selected by selecting one student for each category with high, medium, and low ability, in total three participants. On the subject of high ability, in order to determine the participants, the criteria were writing texts well, drawing well and the level of reflecting good mathematics as well. Medium ability subjects were supposed to meet the criteria in the aspects of writing well, although still relatively low. Low ability subjects on the criteria of aspects of writing and expressing mathematics, classified at a very low level. The factors causing the students' mathematical communication abilities were found to be the use of vocabulary and mathematical language, the students' learning style and the ability to express their ideas.

Keywords: mathematic communication, mathematical communication aspects, equation and inequality linears of one variable

1. Introduction

Education is one of the needs that must be fulfilled throughout human life. So important, education is used aimed at improving the quality of life in order to continue to make the human person better. Because it is through education that a person can be able to achieve what he aspires and in order to develop abilities and skills to be even better as a provision of life that can benefit for himself, society and even the country. Talk about formal education, especially in schools. There are various fields of study that aim to develop students' abilities. One of them is the field of mathematics studies.

Mathematics is one of the fields of study taught at every level of education such as school. This field of mathematics study is expected to be able to make a good contribution to develop students' systematic critical thinking skills. The same opinion was obtained from Rosdiana (2018) who said that mathematics can be useful as a provision for students to have the ability

to think systematically, logically and analytically so that it helps students to solve everyday problems. Mathematics is also a language, not only as a tool used to help in thinking of finding patterns and solving problems, but also as a way to communicate ideas in a systematic, practical and efficient manner. In this case, mathematics is also seen as a very powerful, sure, and not confusing communication tool. The ability possessed by students in particular to express ideas about problem solving as well as mathematical strategies and solutions by oral and written means is called mathematical communication skills (Pratiwi, 2015).

Mathematical communication skills are really needed in understanding the field of mathematics studies, this is in line with the opinion of Asikin in (Hendriana & et al, 2017) which is to help sharpen students 'thinking and as a tool to measure students' understanding and reflecting mathematical understanding. Mathematical communication has a very important role in mathematics learning, because through mathematical communication it can organize and consolidate students' mathematical thinking (Supriadi, 2015). Mathematical communication skills can generally be divided into two categories, the first category is verbal communication (talking) and the second category is written communication (writing). Verbal communication skills can be in the form of verbal expressions and explanations of mathematical ideas such as speaking, listening, and discussion while written communication skills can be in the form of pictures, tables, graphs, questions and other forms of answers in written form (Syahri, 2017).

If communication is done poorly, then the development of mathematical understanding will be hampered. This is in accordance with the learning objectives of the Ministry of National Education (Wijayanto, 2019) including so that students have the ability to communicate ideas with symbols, tables, diagrams or other media to clarify a situation or problem. Currently students' mathematical communication skills are still relatively low, it can be seen when students have difficulty in making conclusions in solving math problems given by the teacher. Other research by (Widjajanti, 2013)and (Sian & et al, 2016) from Brunnei Darrusalam, students still have difficulty in expressing mathematical ideas into symbols or notations correctly. This is also in line with the opinion given by Yudianto in (Fitriyani , Sri, & Aan, 2018) that the geometry ability of students when in elementary school has not been maximized.

Based on these descriptions, at least mathematical communication skills possessed by students need to be possessed properly in order to solve the problem problems that exist in the field of mathematics studies as well as the tasks given by the teacher. Mathematical assignments are designed so that students can experience mathematical processes themselves, such as the process of identifying general classes of problems they are working on (Rahman & al, 2012). In this study the indicators of mathematical communication skills that will be used are as stated by the Ontario Ministry of Education in 2015 (Hendriana & et al, 2017), as follows:

Table 1. Mathematical Communication Capability Indicator

Aspect	Description
1. Written Text, Make an explanation of mathematical ideas in writing	a. Able to provide answers using their own language. b. Identify what is asked about the problem. c. Discuss and write about ideas for resolving strategies in your own language. d. Can explain ideas using mathematical terms

2.	Drawing,	a.	Reflect real objects such as pictures into mathematical ideas.
	Can pour mathematical ideas in the form of pictures, tables or diagrams.	b.	Reflecting situations, ideas or solutions to mathematical problems in the form of images clearly.
3.	Mathematical Expressions,	a.	Can present ideas and situations using mathematical models correctly and completely.
	Able to explain the problematic situation of images or real objects into symbols, mathematical models / mathematical expressions.	b.	Can present ideas using language symbols / mathematical notation correctly.
		c.	Use all the information in the problem appropriately.
		d.	Draw conclusions precisely.

2. Research Method

2.1. Research Design

The research utilized the qualitative descriptive approach, the type of research conducted with the aim of making a systematic, factual, and accurate description of the facts. Descriptions were in the form of words and did not emphasize numbers. In this case the researcher did a description of students' written mathematical communication skills in working on the system of equations and the linear inequality of a variable and the factors that allegedly influenced it.

There are three stages in the process of good mathematical communication namely, (1) written text, able to make mathematical ideas by pouring them in writing, (2) Drawing, can make mathematical ideas in the form of pictures, tables or diagrams, (3) Mathematical Expressions, able to explain the problem situation of images or real objects into symbols, models / mathematical expressions. This research was conducted at SMP Negeri 1 Ceper Klaten in January 2020 with the consideration that the material to be studied was taught to students. The subjects used were grade VII students of SMP Negeri 1 Ceper in Klaten Regency.

2.2. Participants

In the study, three students participated and the participants were selected via purposive sampling technique, by selecting one student who has a high mathematical disposition in good mathematical abilities, one student with moderate mathematical abilities, and one student with low mathematical abilities. Subject selection is done in consultation with the subject teacher. The subjects with high mathematical ability were given the H code, the subjects with moderate mathematical abilities were coded M, and the subjects with low mathematical abilities were given the L code.

2.3. Data Collection and Data Analysis

The data were collected by means of tests and non-tests, so besides researchers as research instruments, several assistive instruments were used to support data acquisition, namely interviews and test sheets. The test instrument was developed according to the material that had been taught, namely the material system of equations and linear inequalities of one variable. The triangulation technique was utilized to obtain the valid data. Triangulation of this technique was based on the data obtained from analysis of test results and interviews.

The test instrument used serves to collect data in writing obtained from the subject under study, thus helping researchers in obtaining data. Then drawing conclusions by paying

attention to the assignment sheet and interview results to find the characteristics of the subject in accordance with the indicators used. The test used as many as one question related to the material system of equations and linear inequalities of one variable.

3. Results and Discussion

Based on research that has been done the results of analysis of student answers include 3 aspects that correspond to the indicators used. It can be observed that students with high mathematical abilities. The following are the results of research conducted in accordance with 3 aspects used and one of the questions worked as follows:

1. Lebar sebuah persegi panjang adalah $(2x - 26)$ cm dan panjangnya adalah x cm . Jika kelilingnya kurang dari 74 cm, tentukanlah panjang dan lebar maksimum dari persegi panjang tersebut!
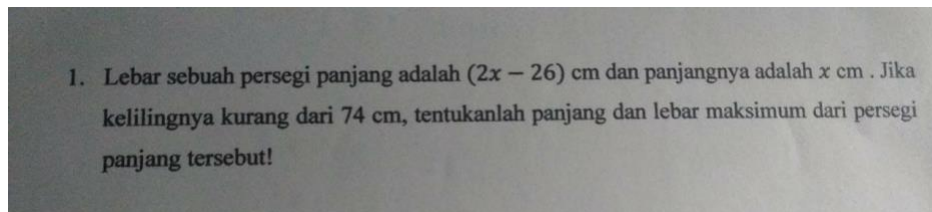
Figure 1. Questions for students

The results of the work on the subject H produced that mathematical communication skills in aspects (1) Writing (Written Text) is so high that it can be observed very well. Subject H is able to explain ideas such as information that has been known and asked for the problem so well. Similarly, in explaining to others in writing so that it can be understood by others so clearly. While aspects (2) Drawing (Drawing) on this subject has been able to explain ideas or solutions to existing problems in the problem can be seen in visual form clearly and correctly. So it can be said that subject H has fulfilled the Drawing aspect (Drawing) well. The third aspect (Mathematical Expression) possessed by subject H can capture ideas and communicate their ideas related to the situation and problems contained in the problem into mathematical ideas well. This can be seen that the ability to use the language of symbols and mathematical models to express ideas and solutions chosen for the problem with a good understanding and be able to draw conclusions that are relevant to the problem at hand. The results of the work on the subject H can be seen as follows:

Figure 2. The results of the work of the subject type H

This can also be seen from the excerpts of the results of interviews on subject H. Excerpts of conversation P as researchers and H are subjects studied with high mathematical abilities. The results of the conversation can be seen that the subject is able to grasp the ideas contained in the problem well.

P: "What do you know about this problem?"
H: "What is known as a rectangle with length x centimeter and width of 2x-26 centimeter"
P: "Then what else?"
H: "Then we know that the circumference is less than 74 cm"
Q: "What then is the question asked about?"
H: "What is asked about that is the maximum length and width of the rectangle"
Q: "Can you describe the information obtained from the problem?"
H: "Yes, sir"

On the results of the work of Subject M on aspects (1) Writing (Written Text) can be fulfilled properly. It can be seen that the writing skills of students with moderate abilities can be observed well in knowing the information contained in the problem well. The subject is able to explain the ideas that exist in his mind and then poured into writing even with clear and understandable language and delivery. Aspects (2) Drawing (Drawing) which is owned by subject M there are no signs of the subject's desire to pour out his ideas in visual form, so the subject has not been able to communicate them in the form of drawings, diagrams or tables. The third aspect (Mathematical Expression) which is owned by subject M is still inaccurate in explaining ideas that will be used to solve problems in the problem and not understanding the problem well. It is seen that the subject has not been able to solve the problem or the solution correctly and correctly to solve the problem and there are still errors in the workmanship, so the subject is still considered less able to explain mathematical ideas in the form of notations, symbols, and mathematical models even though at the beginning it seems correct and able to understand the information in the problem. The results of work on subjects with type M can be seen as follows:

Figure 3. The results of the work subject M

The results of the interview with subject M can be seen that the subject is still confused in illustrating the picture of the problem.
P: "Can you illustrate this problem in the form of pictures?"
M: "(like confusion) I don't know"

P: "What are the steps you will take first when going to work on the problem?"
M: "The first way I did was by inserting what was known in the problem into the formula around the rectangle sir"
P: "Why use that formula, not using another formula?"
M: "Because of the problems around it"

The workmanship of the results of answers made by subject L seen from the ability of mathematical communication through (1) written aspects is still very low, it can be seen that subject L still feels confused in understanding the information contained in the problem, so there is no writing can be seen related to understanding information on the problem. On the ability of mathematical communication in aspects (2) drawing (drawing) is also still very low. The subject still felt confused in pouring ideas into visual form plus the subject felt not yet understood about the existing problems. The aspect (3) of mathematical expressions (Mathematical Expression) possessed by subject L is still very low in terms of ability to express ideas in the form of notations and mathematical symbols and models. The subject still looks difficult to work on the problem, so the subject needs understand the problem first, subject L still needs to improve the answer even though the student is able to remember the formulas needed to answer the problem. The results of the work on the subject L can be seen as follows.

Figure 4. The results of the work subject L

While the results of interviews obtained from subject L indicate that subject L is still confused in capturing the ideas contained in the problem.
P: "Can you describe the information in the problem?"
L: "(silent for a long time) don't know sir"
P: "What are the steps you will take the first time when you are going to work on the problem?"
L: "Using the formula around the rectangle"
P: "Why use that formula, not using another formula?"
L: "Because in the matter, there is written around it"
P: "Then what's the next step?"
L: "The next step is to enter the known length and width into the circumferential formula"
P: "So what?"
L: "Continue to do the calculation"
P: "Does that end there?"
L: "Yes, sir"

Research conducted by (Hikmawati & et al, 2019) also gives results that subjects with high ability fulfill all aspects according to the indicators used. Subjects with moderate and low ability still find it difficult to express mathematical ideas, but are dominant in the writing and drawing aspects.

Mathematical communication skills are indeed very necessary. This is needed by students to gain a good understanding. Students who already have this ability are expected to be able to communicate mathematical ideas so that they are easily understood by others. (Huggins & Maiste, 1999) suggests that one form of mathematical communication is speaking. This is identical to the discussion (discussing) proposed by (Baroody, 1993). Students 'speaking ability in discussing with others is thought to be one of the factors in the ability of students to communicate well or not, so the teacher is expected to choose the learning model appropriately to improve students' discussion skills such as groups. While the second factor is the ability to write. This is consistent with the opinion of Silver et al. (Kosko & J, 2012) state that the ability to write a mathematical communication is considered more capable of helping individuals to think about and explain in detail about an idea. The written mathematical communication skills will help students to express their thoughts to explain the strategies used, increase knowledge in writing algorithms, and generally be able to improve students' cognitive abilities. In addition, (O'Halloran, 2005) states that "mathematical discourse involves language, mathematical symbolism and visual images". The initial ability possessed by students in the form of vocational symbols in mathematics is very important in improving mathematical communication. If students have a large vocabulary of mathematical symbols. Then students are expected to be able to read pictures such as diagrams, variables, constants, and be able to express mathematical ideas better.

4. Conclusion

Communication skills possessed by students with high ability can be said to be very good from their ability to communicate mathematical ideas well into three aspects of mathematical communication, namely aspects (written text), aspects of drawing (drawing), and aspects of mathematical expression (mathematical expression). The communication skills of students with moderate ability only dominate on two aspects, namely the written aspect which is able to explain ideas from the information contained in the problem. Aspects of mathematical expressions (mathematical expressions) even with a lack of understanding. Students who have low ability have aspects of mathematical communication skills on all aspects at a very low level this causes students to be difficult in solving existing problems

5. Suggestions

Based on the research results obtained, the researcher provides the following suggestions: 1) Junior high school students should be specially trained in mathematical communication skills, 2) Further research is needed regarding the achievement and improvement of mathematical communication skills, and 3) teachers should be able to evaluate the learning that has been done so that they can apply it to better learning.

6. Conflict of Interest

The authors state that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE VIEWS OF THE SOCIAL STUDIES TEACHERS ON DEVELOPING STUDENTS' SELF-CONTROL SKILLS

Research Article

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THE VIEWS OF THE SOCIAL STUDIES TEACHERS ON DEVELOPING STUDENTS' SELF-CONTROL SKILLS

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Abstract

The study aimed at determining the views of the Social Studies teachers on developing their students' self-control skills. This study was conducted with the phenomenological design, one of the qualitative research designs. The participants of the study was composed of 25 Social Studies teachers in eight secondary schools in city center of Elazığ, Turkey during Spring Semester of 2019-2020 school year. The participants were determined via convenience sampling model, which is one of the purposeful sampling methods. The data of the study were obtained using the interview technique via semi-structured interview forms. In the analysis of the data content analysis method was utilized. As a result of the study, it was determined that Social Studies teachers defined self-control skills as the capacity to control and check themselves. Self-control skills were determined to have positive contributions on learning in Social Studies teaching such as skills development, awareness of responsibilities, and being independent and self-confident. Families and teachers can be ensured to be models for students in order to develop and develop self-control skills. In developing self-control skills, different methods and techniques can be included in the teaching process considering the individual differences and developmental levels of students.

Keywords: Social Studies, teachers, self-control skills, individual differences, teachers' views.

1. Introduction

Developments in today's world have affected many fields as well as education and have brought along new developments (Topkaya and Şimşek, 2015, p. 153). It is seen that with these experienced developments, today's educational understanding is established on an understanding that gives more importance to the individual and consider the personal development and individual differences of the person more (Narin and Aybek, 2010, p. 337). These changes in educational understanding increase the need for qualified individuals. A society with qualified individuals can only be achieved with a qualified education (Demirkaya, 2008, p. 390). Socio-economic, political, and technological developments experienced have led the concept of skill to develop importance in educational activities and to be included in education programs (Mutluer, 2013, p. 356). In today's modern educational understanding, educational institutions have important tasks in terms of skill training and developing skill (Çelikkaya, 2011, p. 970). The changes in science and technology, varying needs of the individuals and society with these changes, and developments in teaching and learning theories and approaches have affected and changed the roles expected by the individuals. This experienced change shows an individual having the qualifications of producing knowledge, using it functionally in life, thinking critically, solving problems, being decisive, being entrepreneur, having communication skills, being empathic, contributing to society and culture etc. (Milli Eğitim Bakanlığı, 2018). Here, qualified individuals who have many skills are mentioned.

Skill is defined as a concept in the dictionary of the Turkish Language Association (Türk Dil Kurumu, 2020) by stating "the ability to accomplish a work, competence, and one's ability to accomplish a work based on learning and tendency and to conclude an action appropriately", The skill concept is also defined as the talent and ability that enables to do a work or activity well (Kaptan, Yetişir and Demir, 2007, p. 16). Due to the scientific, technological and social changes in this century, it is seen that the 21st century would not be an information age but an age based on skills. The reason is that along with accessing information, it is necessary to produce new information from the information reached and use this information and turn it into a product. For this purpose, it is necessary to reveal the skills that exist in human potential (Tonga, 2019, p. 443). Among the skills that exist in human potential, self-control skills has a special and very important place.

Self-control is defined as one's ability to change oneself and adapt to the environment to have a more ideal adaptation with the world (Rothbaum, Weisz & Snyder, 1982, p. 8), the effort of the self to be controlled by the self (Muraven & Baumeister, 2000, p. 247), the ability to avoid undesirable behavioral tendencies and inhibit these behaviors (Tangney, Baumeister & Boone, 2004, p. 275), the capacity to change one's own reaction to achieve his/her goals (Baumeister, Vohs & Tice, 2007, p. 351), a person's control and limit on his/her reactions, behaviors or tendencies to pursue a certain goal (Karataş, 2013, p. 41), a mechanism developed by individuals to understand and cope with the world (Kaygusuz and Özpolat, 2016, p. 198), and behaviors exhibited by individuals for eliminating or deactivating their strong reactions (Dağ, 2018, p. 14). In short, self-control can be expressed as individuals' ability to control and check his/her emotions, thoughts and behaviors to reach a certain goal, the mechanism to understand and cope with the world, ability to change him/herself and to adapt the environment, ability to prevent undesirable behavior, will to postpone desires and emotions and the effort of managing and directing emotions.

People with high self-control skills can be described as careful, successful, planned, responsible and reliable (Barrick & Mount, 1991, p. 4). Attitudes and behaviors of these individuals include more positive characteristics than individuals with low self-control skills and they can make an effective decision by objectively evaluating different possibilities (Dağ, 2018, p. 28). The most important area where the self-control skills contributes to the individual is the education field, which is an important process, in human life (Can and Öztürk, 2018, p. 2027). Self-control skills affects many values and skills and it is also affected by many values and skills. In this context, self-control skills is associated with many skills and values, in other words, it allows many values and skills to emerge and realize (Tonga, 2019, p. 443).

Throughout history, educational institutions have had great tasks in determining the future of nations and states (Akpınar and Kaymakcı, 2012, p. 606). The basis function of educational institutions is to enable students to develop information, skills and values that are necessary to be an effective and efficient citizen in the 21st century. An important part of these information, skills and values are tried to be given in primary education institutions (Kılıçoğlu, 2014, p. 6). In primary education, the Social Studies lesson has a great importance for individuals to acquire all the knowledge, skills, and values necessary for social life and transform them into attitudes and behaviors (Er, 2010, p. 1). When considering that the most comprehensive goal of Social Studies lesson is to raise effective citizens (Öztürk, 2007, p. 48; Safran, 2008, p. 15; Tonga, 2019, p. 434), it is emphasized that developing necessary knowledge, skills, and values at first to raise students as an effective citizen is necessary in Social Studies teaching (Öztürk, 2007, p. 25). Developing knowledge, skill and values about personal, family, regional, national and global issues in Social Studies lesson helps students to make correct and logical decisions in their daily lives (MEB, 2015, p. 1).

Developing the skills of making rational decisions and exhibiting attitudes and behaviors as responsible citizens in students is one of the main goals of Social Studies teaching (Taş and Kıroğlu, 2018, p. 700). Helping students to develop necessary skills in Social Studies lesson contributes to the socialization of students (Çelikkaya and Kürümlüoğlu, 2017, p. 142-143). Considering that the knowledge, skills and behaviors developed in primary school period do not lose their effect in the following years, it is seen that teaching Social Studies lesson in this period has a strategic importance (Safran, 2008, p. 15). For this reason, it is aimed with Social Studies lesson in curriculum for students to develop skills of "research, environmental literacy, perception of change and continuity, digital literacy, critical thinking, empathy, financial literacy, entrepreneurship, observation, map literacy, legal literacy, communication, collaboration, stereotype and recognizing prejudice, using evidence, decision making, location analysis, media literacy, spatial perception, self-control, political literacy, problem solving, social participation, drawing and interpreting tables, graphs and diagrams, using Turkish correctly, beautifully and effectively, and perceiving time and chronology with innovative thinking" (MEB, 2018). When considering that Social Studies lesson aims to raise effective citizens, self-control skills appears as a skill that can reveal the goals of Social Studies lesson. The reason is that there are various behaviors and rules that children should and should not do in order to raise an individual as an effective citizen. Self-control skills expresses that the child should and should not act within certain criteria and rules (Tonga, 2019, p. 434). Self-control skills is one of the basic skills that help individuals to control themselves and to be happy and successful (Aydın and Ziatdinov, 2016, p. 392). When the Social Studies curricula are examined, it is seen that while self-control skills was not directly involved in previous curricula, self-control skills is included in the curriculum of 2018 Social Studies lesson. When the curriculum is evaluated in terms of learning fields and achievements in which the self-control skills is included, it is seen that the skill is not included in the curriculum sufficiently (Tonga, 2019, p. 434-436).

It is seen that self-control skills is of particular importance for teachers who are an important component of the educational process in school environment (Sünbül, 2004, p. 257). In the educational environment, teachers with high self-control skills are seen to be more effective and professional in training students. It has been also determined that the teaching method and techniques used by the teachers and their communication with the students are appropriate to the constructivist approach (Dağ, 2018, p. 28-29). It is seen that teachers have important roles in ensuring that students develop and perform self-control skills. Teachers can help students to develop self-control skills by giving them responsibility, preparing classroom rules in collaboration with students, helping them to develop free time habits, and directing them to explain the reasons and importance of an expected behavior (Aydın and Ziatdinov, 2016, p. 392). In fact, it is seen that teachers with high self-control skills use different methods and techniques in helping students to develop and perform this skill in the education process, have better communication with students and are more effective.

When the literature is examined, it is seen that there is no study on self-control skills in the Social Studies lesson but there are studies on self-control in different fields (for example, Tangney, Baumeister & Boone, 2004; Duyan, Gülden and Gelbal, 2012; Peker, 2012; Kaygusuz and Özpolat, 2016; Bertrams, Baumeister & Englert, 2016; Metin, Harma, Gökçay and Bahçivan Saydam, 2017; Özgül, 2017; Can and Öztürk, 2018; Gülle, 2018; Odacı and Kınık, 2018; Şubaş, 2018; Tanrıkulu, 2019; Yakut, 2019). Self-control skills is among the important and basic skills that should be acquired by students in the curriculum of Social Studies lesson. This study is extremely important in terms of revealing the views of Social Studies teachers, which are an important component of the education process, on self-control

skills. In addition, the subject is important and it is believed that studies should be conducted about the self-control skills and these are another reason that makes the research important. Therefore, the results of this study, investigating the views of Social Studies teacher on self-control skills, are believed to be important in terms of contributing to the literature and the related studies.

The main research question of the study is "***What are the viewpoints of the Social Studies teachers on developing their students' self-control skills?***" Based on this main research question the sub-resaerch questions of the study can be stated as folllows:

1. How do Social Studies teachers define the self-control skills?
2. What are the self-assessments of Social Studies teachers about self-control skills competence?
3. What methods, techniques and activities do Social Studies teachers use when teaching Self-control skills?
4. What are the contributions of self-control skills on learning in Social Studies teaching?
5. What are the problems encountered by Social Studies teachers in teaching self-control skills?
6. What are the recommendations of Social Studies teachers on developing self-control skills more effectively?

2. Method

2.1. Design of the Study

This study was conducted using the phenomenological design, which is one of the qualitative research designs, in order to determine the views of Social Studies teachers on self-control skills. The phenomenological design aims to investigate the phenomena that we are aware of in our daily life, we encounter in various ways but do not fully comprehend and do not have an in-dept and detailed understanding (Yıldırım and Şimşek, 2016, p. 69). Phenomenology is a study pattern defining the common meaning of experiences of several people about a phenomenon or concept (Creswell, 2013/2020, p. 85). In addition, phenomenology also focuses on understanding how people make sense of their experiences and transform experience into consciousness (Patton, 2000/2014, p. 104).

2.2. Participants

The participants of the study were composed of a total of number of 25 Social Studies teachers including 12 women and 13 men working in eight secondary schools located in the city center of Elazığ in spring semester of 2019-2020 school year. The participants was determined using convenience sampling which is one of the purposeful sampling methods. In the convenience sampling method, the researcher chooses a situation that is close to him/her and easy to reach in order to bring speed and practice to the study (Yıldırım and Şimşek, 2016, p. 123). For this study, ethical approval was obtained from Fırat University Rectorate, Social and Human Sciences Researches Ethics Committee (03/03/2020-382207). Volunteering was considered in including Social Studies teachers in the study.

2.3. Data Collection Tool and Process

The data of the study were obtained via the interview method using a semi-structured interview form. Qualitative interviews often involve a process containing open-ended questions to reveal the views and ideas of the participants (Creswell, 2013/2016, p. 190). Semi-structured interviews are the interviews that combine fixed alternative answering and studying in the relevant field in depth (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz and

Demirel, 2013, p. 152). For this reason, semi-structured interview form developed by the researchers was used in the study. This interview form is prepared to obtain the same type of information from different people by addressing similar issues, try to reveal various dimensions of the subject, cover a list of questions and topics to be discovered during the interview, ensure to obtain more systematic information from different individuals, and provide time flexibility to the researcher (Avcı, 2008, p. 160).

A literature review was conducted to prepare the interview form of the study. The draft interview form prepared by the researchers was then made ready by taking the opinions of three academic members from Fırat University, Faculty of Education, Division of Turkish and Social Sciences Education, Department of Social Studies Education. In this study, an interview form consisting of 6 questions developed by the researchers for Social Studies teachers was used as the data collection tool. Since face-to-face interviews were not possible due to Covid-19 pandemic process experienced during the study period, the study was carried out with interviews held online and by phone. Before starting the interview, the participants was informed briefly about the subject of the study and the questions in the study and the interviews were conducted.

2.4. Data Analysis

The content analysis method was used to analyze the data obtained in the study. "Content analysis is a scientific approach investigating the social reality by classifying the message contained by the verbal, written and other materials objectively and systematically in terms of meaning and/or grammar, transforming them into numbers, and making inferences" (Tavşancıl and Aslan, 2001, p. 22).

A qualitative data analysis program was used for the evaluation of the study data. "Data analysis in phenomenological studies are aimed at revealing experiences and meanings. In the content analysis conducted for this purpose, there is an effort to conceptualize the data and reveal the themes that can define the phenomenon" (Yıldırım and Şimşek, 2016, p. 72). The data obtained from the interviews were transferred to the computer environment as they were and made suitable for analysis. The data in the interview form were coded in short and meaningful symbols and draft themes were determined by providing correlation with the relevant literature. The codes were rearranged according to these draft themes and the draft themes were checked and finalized. The correlation between the themes was determined and the main theme and sub-themes were gathered under the study questions. In addition, a code and theme list was prepared and the data were organized by making this list consistent within itself. In this way, how many participants emphasized the same theme was revealed and the areas where the themes were more concentrated were determined. These themes and number of loadings were presented as models to provide a clearer and more comprehensive image. These models were interpreted by giving direct quotations from the participants' views. The participants' views on the themes and sub-themes were given in italics within quotation marks. Personal information regarding the participants was given with coding including abbreviations (T.1.F/M), (Teacher, 1. person, Female/Male) at the beginning of the participants' views.

Reporting the data in detail as a result of the study and the detailed explanation of how the researchers reached the results are among the basic criteria that are considered important in terms of ensuring validity in a qualitative study (Yıldırım and Şimşek, 2016, p. 270). For this reason, how the study results were reached was explained in detail in order to ensure validity in the study and the data obtained as a result of the study were included in the results section.

In order to ensure the reliability of the study and to eliminate the individual effects that may be encountered during the coding process of the data, coding was performed by evaluating the study independently by the expert and researcher (coders) and then, the reliability of the study was calculated by determining the number of consensus and disagreement to find whether or not there is an agreement between the coders by comparing these coding and using Miles & Huberman's (1994/2016, p. 64) reliability formula "reliability=number of consensus/total consensus +number of disagreement". According to the reliability formula, the reliability value of the study was calculated as 92% and the agreement between coders was determined as 92%. According to Saban (2009, p. 288), a desired reliability level is achieved in qualitative studies in cases where the agreement is 90% and above as a result of the expert and researcher evaluations.

Credibility, transferability, consistency, and confirmability strategies specified by Erlandson, Harris, Skipper & Allen (1993, p. 28-34) were benefited in the study in order to ensure the validity and reliability. Validity and reliability were ensured by conducting expert review and participant confirmation to evaluate credibility, detailed description and purposeful sampling to increase transferability, consistency review to ensure consistency and confirmability review to ensure confirmation. In the study, an expert review was performed by asking a person specialized in research-related subjects and qualified research methods to review the study in detail for evaluating the credibility. In addition, the data obtained as a result of the study and the results reached regarding the data were confirmed by the participants so that participant confirmation was made. In order to increase transferability, the raw data were arranged adevelop first according to the themes determined as a result of the analysis and detailed description was made by sticking to the nature of the data and without adding any comments. In addition, purposeful sampling method, which aims to reveal both events and facts as well as the characteristics of these events and facts, was used in the study. In order to ensure consistency, a consistency analysis was conducted by examining the study from an external perspective and revealing if the researchers were consistent during the research process. In order to ensure confirmability, an expert compared the results obtained by the researchers with the raw data and confirmation examination was performed if or not the researchers operated the confirmation mechanism during the research process.

3. Findings

Six main themes were determined regarding the views of Social Studies teachers on self-control skills. These themes were determined as "self-control skills", "self-control skills competence", "methods and activities used while teaching self-control skills", "contributions of self-control skills on learning", "problems encountered in teaching self-control skills" and "recommendations on developing self-control skills effectively". These main themes were presented in models with the number of loadings.

3.1. Results Regarding Self-control skills

The views of the Social Studies teachers on self-control skills were obtained and when the data obtained from these views were evaluated, self-control skills theme was found to have seven sub-themes. Figure 1 shows model and number of loadings for this theme.
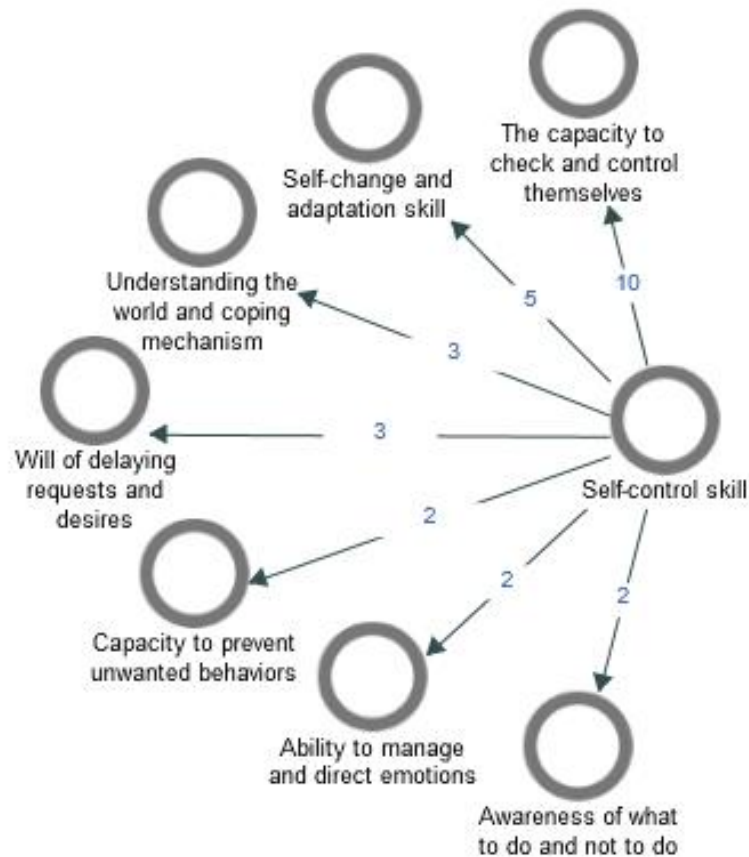
Figure 1. Model for self-control skills

When the views of the teachers on self-control skills were evaluated, the teachers were seen to define self-control skills mostly as "the capacity to check and control themselves". Other sub-themes determined for self-control skills were determined as "self-change and adaptation skill", "understanding the world and coping mechanism", "will of delaying requests and desires", "capacity to prevent unwanted behaviors", "ability to manage and direct emotions", and "awareness of what to do and not to do". Some sub-themes and the participants' views are given below.

While a participant **(T.5.F)** who associated self-control skills with "capacity to check and control themselves" sub-theme said that *"Self-control skills can be defined shortly as the ability of a person to control his/her own action and behaviors to reach a goal.",* another participant **(T.25.M)** was seen to emphasize self-control as an important skill that enables the person to check and control his emotions, thoughts and behaviors to reach his/her goals by stating that *"Self-control skills is to control our behaviors at the point of reaching our goals or sometimes postpone what we want to do for a while. In the shortest meaning, self-control is our ability to check and control ourselves.".*

While a participant **(T.1.F),** explaining self-control skills with "self-change and adaptation skill" sub-theme, stated her view as *"Self-control can be evaluated as the ability to change and adapt a person's emotions, thoughts and behaviors. Self-control is a skill that starts to develop in the family during the first years of life. We should remember that there are individual differences in the self-control capacities of people.",* the participant **(T.14.M)** who thinks the same way was expressed self-control skills as the self-change and adaptation capacity of the person by stating that *"Self-control skills can be expressed as a person's capacity to change him/herself to have a better adaptation with the world and to adapt to the environment.".*

Concerning the "will of delaying requests and desires" sub-theme, the participant **(T.24.M)** explained self-control as a skill type enabling a person to resist and postpone his/her requests and desires in order to achieve his/her goals by stating that *"Self-control skills is defined as the will of delaying requests and desires with a person's ability to control his/her urges, desires and wills in order to reach a certain goal."*.

Concerning the "Capacity to prevent unwanted behaviors" sub-theme, the participant **(T.10.M)** expresses self-control skills as an internal orientation signifying avoidance of exhibiting unwanted behavioral tendencies along with keeping the internal reactions under control by saying that *"Self-control can be defined as the ability to keep one's behaviors under control as well as the capacity to prevent unwanted behaviors"*.

3.2. Results on Self-control skills Competence

The views of the Social Studies teachers on self-control skills competence were obtained and this theme was seen to concentrate around three sub-themes in line with the data obtained from these views. Figure 2 shows model and number of loadings for this theme.
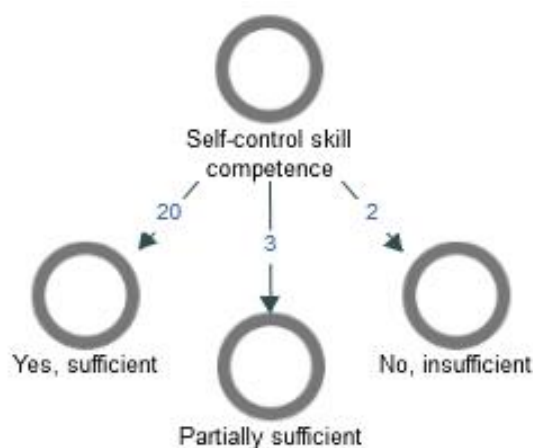
Figure 2. Model for self-control skills competence

When the views of Social Studies teachers about self-control skills competence were examined, they were seen to be divided into three sub-themes: "yes, sufficient", "partially sufficient" and "no, insufficient". Some sub-themes and the participants' views are given below.

While a participant **(T.2.M)** who associated self-control skills competence with "yes, sufficient" sub-theme said that *"when I evaluate myself objectively about self-control skills competence, I believe that I have this skill as a Social Studies teacher and I am a model for my students in the classroom."*, another participant **(T.19.F)** made an evaluation indicating that she was sufficient in self-control skills by saying that *"I believe that my self-control skills competence is good. I think that the feedback I received from my students and circle and my status of being a role model also confirm that."*.

While a participant **(T.6.M),** explaining self-control skills competence as "partially sufficient" sub-theme, explained his view as *"... since I have inadequacies, I think I am partially sufficient."*, another participant **(T.13.F)** emphasized that she was partially sufficient about self-control skills by saying that *"When I evaluate myself about self-control skills competence, I do not see myself fully sufficient. Since I know I have shortcomings in some subjects, I believe I am partially sufficient."*.

While a participant **(T.16.M)** associating the self-control skills competence with "no, insufficient" sub-theme stated his view as *"Of course I'm not at the level I want, I'm trying to*

develop myself in this regard.", another participant **(T.22.M)** stated that he did not see himself sufficient about self-control skills with the negative effect of internal and external factors by saying that *"I do not see myself sufficient about self-control skills competence. I believe internal and external factors cause us to be insufficient about self-control."*.

3.3. Results Regarding The Methods and Activities Used While Teaching Self-control skills

The views of the Social Studies teachers on the methods and activities used while teaching self-control skills were obtained and when the data obtained from these views were examined, this theme was determined to have eight sub-themes. Figure 3 shows model and number of loadings for this theme.
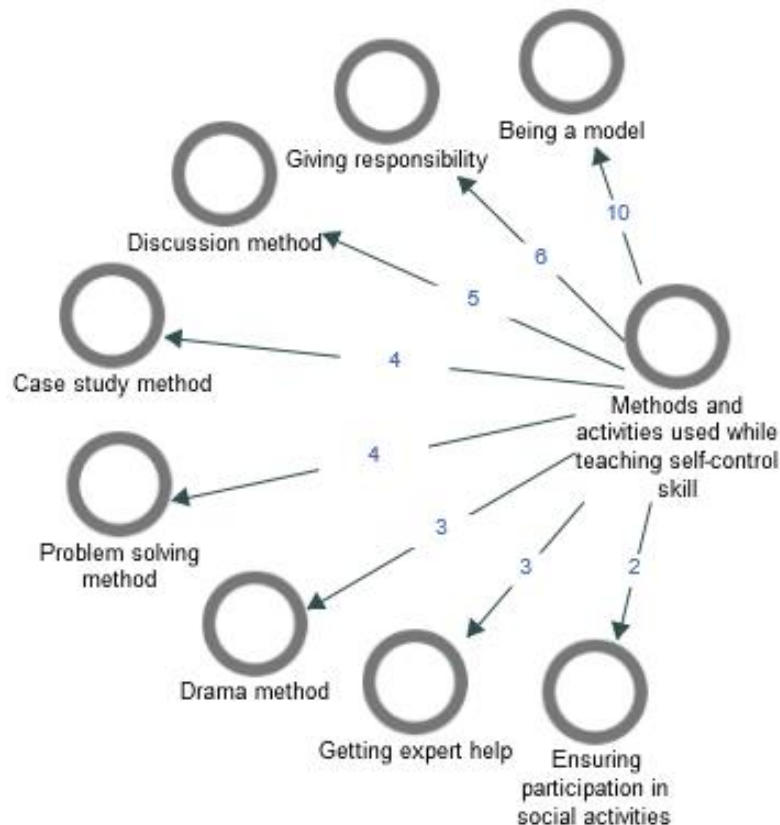
Figure 3. Model for the methods and activities used while teaching self-control skills

It was determined that the Social Studies teachers used different methods and activities in teaching self-control skills. When the teachers' views were evaluated, it was seen that the highest loading was made on the "being a model" sub-theme. In addition, the other sub-themes were determined as; "giving responsibility", "discussion method", "case study method", "problem solving method", "drama method", "getting expert help", and "ensuring participation in social activities", respectively. Some sub-themes and the participants' views are given below.

While a participant **(T.2.M)** who associated methods and activities used while teaching self-control skills with "being a model" sub-theme expressed his views as *"I think that the teacher should move away from his/her daily habits and behaviors in the classroom environment and act as a teacher, control him/herself, know what, where and how to do it and the teacher should be a model for students in order to help them to develop self-control skills."*, another participant **(T.15.F)** expressed her views as *"In the classroom, I try to be a model for my students with my stance, what I say and my behaviors, I think it is a very useful*

way to teach the self-control skills. We tell the student that we do it, you can do it, and you can succeed, too.". In fact, self-control skills was stated to carry a special importance for teachers who have an important place in Social Studies teaching process and it was explained that the teachers were a model for students with their thoughts and behaviors.

While a participant **(T.7.F)** who explained her view about "giving responsibility" sub-theme stated her thoughts as *"I believe that tasks and responsibilities should be given to our students based on their ages and development levels while teaching self-control skills.",* another participant **(T.18.M)** thinking similarly was found to state his views that self-control skills can be developed by giving responsibilities to the students with his statement that *"If we want our students to be self-controlling individuals who are aware of what they should and should not do, that is, they have self-control skills, we should give them responsibilities. Thus, the students who take responsibility are enabled to fulfill their responsibilities by activating the auto-control mechanisms.".*

While one of the participants **(T.1.F)** stated her views on "case study method" sub-theme as *"Self-control is a learnable skill. I use many methods while teaching this skill. The most important way to strengthen the self-control skills is to give students case events in the classroom and ensure them to examine these examples carefully.",* another participant **(T.20.M)** who thought the same way, emphasized that case study method allowed students to be aware of what they should and should not do by saying that *"Social Studies lesson has characteristics of being an important course preparing students for life. I generally give examples from the environment the students live in and current events experienced in order to teach them self-control skills. In this way, I try to make students comprehend how they should behave in many issues that they may encounter.".*

3.4. Results on Regarding the Contributions of Self-control skills on Learning

The teachers' views on the contributions of self-control skills on learning in Social Studies teaching were obtained. When the data obtained from these views were examined, this theme was determined to have nine sub-themes. Figure 4 shows model and number of loadings for this theme.
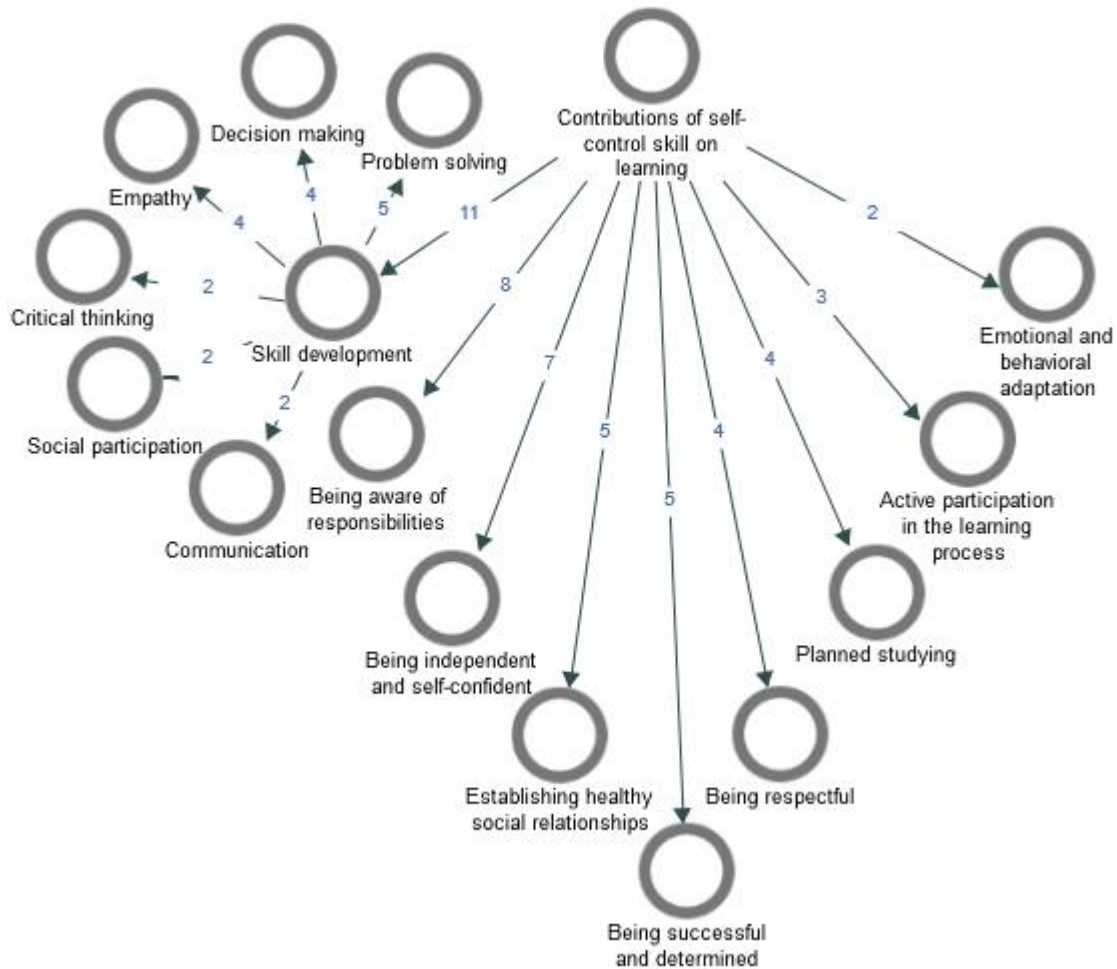
Figure 4. Model for the contributions of self-control skills on learning

When the teachers' views on contributions of self-control skills on learning in Social Studies teaching were examined, the highest loading was seen to be expressed in "skill development" sub-theme. This theme was divided into six sub-categories as "problem solving", "decision making" "empathy", "critical thinking", "social participation", and "communication". The other sub-themes determined for contributions of self-control skills on learning were determined as "being aware of responsibilities", "being independent and self-confident" "establishing healthy social relationships", "being successful and determined", "being respectful", "planned studying", "active participation in the learning process" and "emotional and behavioral adaptation", respectively. Some sub-themes and the participants' views are given below.

While the participant **(T.3.F)** who associated contributions of self-control skills on learning with "skill development" sub-theme stated her views as *"the most important effect of self-control skills on learning in Social Studies teaching is that it helps students to improve their decision making, social participation, empathy, problem solving and communication skills."*, another participant **(T.21.F)** stated her views as *"Social Studies is a lesson in which knowledge, skills and attitudes are given to students. Since self-control is a process where students decide on their own behavior, their decision-making skill also improves."*. It was determined that Social Studies teachers expressed that self-control skills had a positive effect on the development of some skills such as, problem solving, decision making, empathy, social participation and communication on learning. In addition, self-control skills is seen to be associated with many skills.

While a participant **(T.6.M)** explained his view on "Being aware of responsibilities" sub-theme as *"Self-control is one of the most important skills that students should develop in Social Studies teaching. Both Social Studies teachers and the students they educate must have this skill. Self-control skills has many positive effects on learning. The first and most important of these effects is that students have being aware of responsibilities."*, another participant **(T.25.M)** was seen to express that this skill was effective in terms of helping students to be aware of responsibilities by stating that *"... enables students to be aware of own responsibilities and take responsibility of their behaviors."*.

While a participant **(T.15.F)** stating her views on "establishing healthy social relationships" sub-theme explained her thoughts as *"since Social Studies is a lesson that concerns the society and society is made up of individuals, the existence of a healthy society becomes possible by ensuring students to develop self-control skills. I see that the self-control skills developed helped students in establishing healthy social relationship with their environments both in classroom environment and normal life."*, another participant **(T.18.M)** thinking similarly stated that self-control skills helped students to establish healthy social relationship by saying that *"I see that students who have self-control skills are more successful in social relations with their friends at school."*.

3.5. Results on the Problems Encountered in Teaching Self-control skills

The teachers' views on the problems encountered in self-control skills in Social Studies teaching were obtained. When the data obtained from these views were assessed, this theme was determined to have nine sub-themes. Figure 5 shows model and number of loadings for this theme.
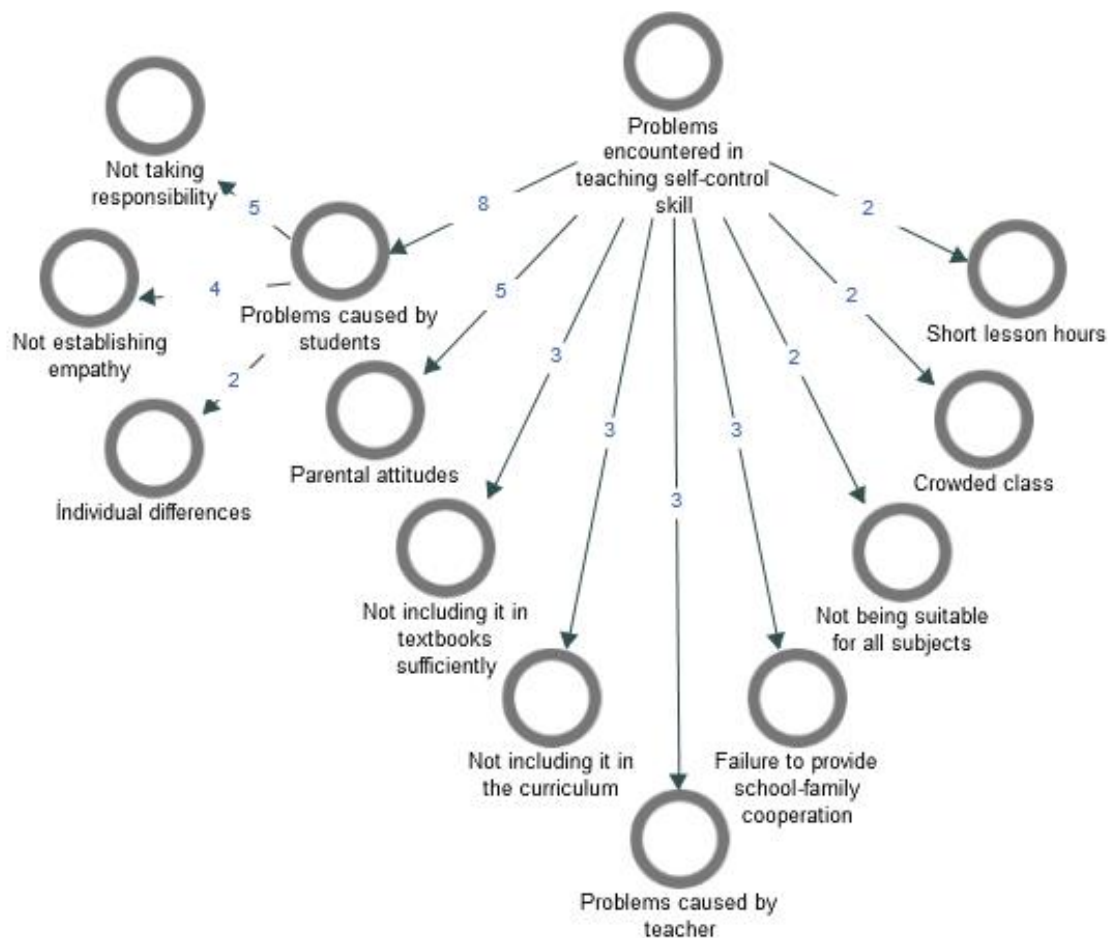
Figure 5. Model for problems encountered in teaching self-control skills

When the views on the problems encountered in self-control skills in Social Studies teaching were evaluated, it was determined that the sub-theme that teachers uploaded the most was "problems caused by students". This theme was seen to be divided into three sub-categories including "not taking responsibility", "not establishing empathy" and "individual differences". The other sub-themes determined about the problems encountered were listed as "parental attitudes", "not including it in textbooks sufficiently", "not including it in the curriculum", "problems caused by teacher", "failure to provide school-family cooperation", "not being suitable for all subjects", "crowded class" and "short lesson hours", respectively. Some sub-themes and the participants' views are given below.

While a participant **(T.4.M)** who associated problems encountered in teaching self-control skills with "problems caused by the student" sub-theme express his views as *"We encounter some problems caused by the student during self-control skills teaching process. For example, student does not want to take responsibility, does not establish empathy to understand his/her friends and the presence of individuals differences etc."*, another participant **(T.5.F)** explained her views as *"Self-control is one of the most useful processes in personality structure. However, there are individual differences in students' self-control capacities. These individual differences can cause negative situations in the classroom. For example, some of my students have problems controlling their anger or keeping their promises."*. It was determined that the teachers stated that they experienced problems caused by the students related to not taking responsibilities, not trying to establish empathy and the presence of individual differences between students during self-control skills teaching.

While a participant **(T.16.M)** stated his view about "parental attitudes" sub-theme as *"We generally encounter problems due to parental attitudes. The biggest problems for us are that whatever the child wants are done, there are no rules at home or the rules are not obeyed, given homework and responsibilities are done by the families, families take decisions on behalf of the child, and there are excessively oppressive or free family environment."*, another participant **(T.19.F)** with similar thoughts expressed her views as *"The negative effect of the family on the child is just one of the problems experienced. We see that some parents are too oppressive and intrusive. Such families often tend to control their children and this prevents the child from learning to regulate and control her/himself. Everything that the child learns incorrectly or does not learn in the family environment also negatively affects the teaching and learning process."*. It is seen that teachers stated that the parental attitudes in family environment are important in the process of teaching this skill but they experience some problems caused by the family.

While a participant **(T.9.F)** explaining "Not including textbooks sufficiently" sub-theme stated her views as *"Textbooks also absolutely have a share in developing self-control skills, but it is definitely not enough alone. I believe that self-control skills is not emphasized enough in Social Studies textbooks, even in Social Studies curriculum."*, another participant **(T.22.M)** with the same thoughts stated that problems were experienced due to the fact that self-control skills are not included in Social Studies textbooks sufficiently, thus textbooks should be enriched by saying that *"I don't think Social Studies textbooks are sufficient to teach this skill. I believe textbooks should be enriched."*.

3.6. Results on Recommendations on Developing Self-control skills Effectively

The teachers' views on helping to develop self-control skills effectively in Social Studies teaching were obtained and the theme was determined to concentrate around ten sub-themes

in line with the data obtained from these views. Figure 6 shows model and number of loadings for this theme.
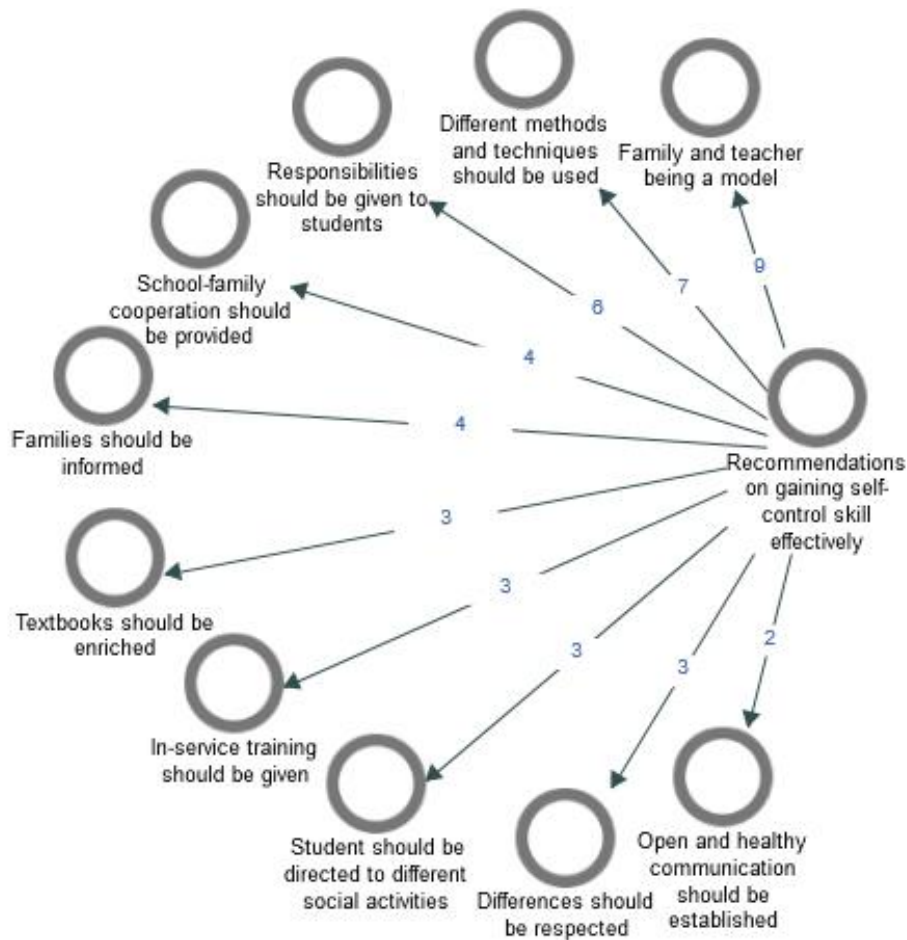
Figure 6. Model on the recommendations on developing self-control skills effectively

When the data obtained from the teachers' views on developing self-control skills effectively in Social Studies teaching were examined, the highest loading was determined to be made in "family and teacher being a model" sub-theme. The other sub-themes for this main theme were determined as; "different methods and techniques should be used", "responsibilities should be given to students", "school-family cooperation should be provided", "families should be informed", "textbooks should be enriched", "in-service training should be given", "student should be directed to different social activities", "differences should be respected", and "open and healthy communication should be established". Some sub-themes and the participants' views are given below.

While a participant **(T.2.M)** associating recommendations on developing self-control skills effectively with "family and teacher being a model" sub-theme expressed his views as *"In order to help children to develop self-control skills, families and teachers need being a model by reviewing their own behaviors. In this regard, we first apply what we say ourselves, we should be a model for the child with our behavior and we must always behave consistently."*, another participant **(T.13.F)** recommended that families and teachers should be a model for students in order to raise individuals with high self-control by saying that *"I believe that families and teachers should always be a model for children in order for the children to be individuals having the skill of controlling their own thoughts, emotions and behaviors."*.

A participant **(T.6.M)** explaining "different methods and techniques should be used" sub-theme stated his views as *"attention should be paid to use different method and techniques in Social Studies lesson in order to solve problems encountered about self-control skills."*. Another participant **(T.24.M)** thinking similarly about the theme explained his views as *"I believe that many different methods and techniques such as case study, discussion, drama and problem solving method should be used in order to teach self-control skills more effectively in Social Studies lesson and other lessons."*. In fact, it was stated that different methods and techniques should be used more in Social Studies lesson in order to help students to develop self-control skills effectively since using different methods and techniques in lessons draw students' attentions more easily and makes the education process more enjoyable.

While a participant **(T.17.F)** stated her views about "school-family cooperation should be provided" sub-theme as *"In order to prevent unwanted student behaviors in the classroom, cooperation should be made between the school administration and the family and act accordingly."*, another participant **(T.19.F)** thinking the same way pointed out that school-family cooperation should be provided in order to help students to develop self-control skills by saying that *"Social Studies Teaching is a lesson that helps students to regulate and control their behaviors. In this lesson, school-family cooperation should be provided in order for students to develop self-control skills effectively."*.

4. Conclusion, Discussion and Recommendations

When the results obtained in line with the views of Social Studies teachers about self-control skills were examined, the following results were obtained.

It was determined that Social Studies teachers defined the self-control skills as "self-check and control capacity". In addition, it was also seen that the teachers expressed self-control skills as "self-change and adaptation skill", "understanding the world and coping mechanism", "will of delaying requests and desires", "capacity to prevent unwanted behaviors", "ability to manage and direct emotions", and "awareness of what to do and not to do".

It was concluded that Social Studies teachers evaluated themselves about self-control skills competence as "yes, sufficient", "partially sufficient" and "no, insufficient".

It was determined that Social Studies teachers benefited from different methods and activities such as "being a model", "giving responsibility", "discussion method", "case study method", "problem solving method", "drama method", "getting expert help" and "ensuring participation in social activities" in teaching self-control skills.

In Social Studies teaching, self-control skills has significant contributions on learning in terms of "skill development (problem solving, decision making, empathy, critical thinking, social participation and communication)", "being aware of responsibilities", "being independent and self-confident" "establishing healthy social relationships", "being successful and determined", "being respectful", "planned studying", "active participation in the learning process" and "emotional and behavioral adaptation". Similarly, in the study by Tangney, Baumeister & Boone (2004), they concluded that the students with high self-control level also had high success level. In another study by Bertrams, Baumeister & Englert (2016), high self-control of students was seen to affect their mathematics lesson success positively.

It was determined that teachers mostly expressed that the problems encountered in self-control skills in Social Studies teaching were related to "problems caused by students (not taking responsibility, not establishing empathy and individual differences)". In addition, teachers were also stated that they experienced problems such as "parental attitudes", "not

including textbooks sufficiently", "not including in the curriculum sufficiently", "problems caused by teacher", "failure to provide school-family cooperation", "not being suitable for all subjects", "crowded class" and "short lesson hours". This result is similar to the result found in the study conducted by Özgül (2017) on the correlation between self-control and parental attitude in high school students, indicating that excessively oppressive-authoritarian parental attitude negatively affected adolescent's inability to express him/herself comfortably, his/her inability to make decisions without his/her parents on many issues, personal development along with self-development and self-control.

Concerning developing self-control skills effectively in Social Studies teaching, teachers were mostly seen to recommend "family and teacher being a model". It was also determined that teachers made different suggestions such as "different methods and techniques should be used", "responsibilities should be given to students", "school-family cooperation should be provided", "families should be informed", "textbooks should be enriched", "in-service training should be given", "student should be directed to different social activities", "differences should be respected" and "an open and healthy communication should be established".

Depending on the study results, the following suggestions can be put forward:

• It can be ensured that the families and teachers are being a model to students in order to develop and develop the self-control skills.

• In developing self-control skills, different methods and techniques can be included more in teaching process by considering individual difference and development levels of the students.

• Contents and activities in Social Studies textbooks can be enriched in such a way to develop the self-control skills which the curriculum aims to have student develop.

• According to the study results, developing self-control skills in students was significantly affected by the parents' attitudes. For this reason, families can also be informed about the self-control skills.

• In helping students to develop self-control skills, it was seen that some problems caused by the skill being unsuitable for all subjects, crowded classes and short lesson hours were experienced. For this reason, necessary arrangements can be made by considering these problems in order for students to reach an education level with a higher quality.

• Considering the effect of attitudes of teachers who educate students in developing self-control skills, in-service training can be given to teachers in order to help students to develop self-control skills more effectively.

• In order for students to develop self-control skills, which is crucial in education, responsibilities, that will make the students active in this process, should be given to them by considering their development levels.

• School-family cooperation should be provided so that the self-control skills can be developed and developed.

• This study was conducted with Social Studies teachers for helping students to develop self-control skills. It can be recommended to conduct studies dealing with the views of teachers and students about self-control skills together.

5. Conflict of Interest

The author states that there is no conflict of interest.

6. Ethics Committee Approval

The ethics committee approval was received from Fırat University (No: 382207).

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SERVANT LEADERSHIP THROUGH SUPPORT: A CASE OF CENTRAL KENYA CONFERENCE SECONDARY SCHOOLS

Research Article

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SERVANT LEADERSHIP THROUGH SUPPORT: A CASE OF CENTRAL KENYA CONFERENCE SECONDARY SCHOOLS

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Abstract

Servant leadership is an important modern leadership style which is known for enhancing the ethical precedence in contemporary organizations. The objective of the study was to determine administrators' awareness and practice of Servant Leadership style through support in Central Kenya Conference SDA secondary schools. The research used descriptive-comparative research design. The target population was 280 respondents. Respondents were purposively sampled. Data was collected using structured questionnaires administered to 82 teachers and six principals. Descriptive statistics and inferential statistics were used to analyze data. The study revealed that 83.3% Principals tend to agree that they practiced servant leadership; 83.3% of administrators were male, 66.7% had bachelor's degrees, 59.8% were middle aged and 66.7% of teachers had 5-10 working experience. There was no significant difference on teachers' evaluation on principals' practice of servant leadership in CKC SDA secondary schools through service, support and empowerment across categories of Gender, Age and Teaching Experience. The findings of this study therefore implied that although principals are aware of the concept, servant leadership style was not adequately practiced in CKC SDA secondary schools, hence there needs to be measures in place so that servant leadership will be practiced as expected of SDA educational leaders.

Keywords: servant, support, schools, leadership

1. Introduction

Servant leadership through support is one the leadership attribute identified by a number of scholars. Bosco and Melchar (2010) revealed that servant leaders support the professional growth of employees. When employees professionally grow, they tend to perform their organizational roles better. Spears (2010) posits that servant leaders are deeply committed to supporting the growth of every person in an organization. They support workers by nurturing their personal as well professional growth. This is practically achieved by the provision of funds towards their professional development. Servant leaders support followers by helping them to develop and succeed and by giving them opportunities to maximize the utilization of their abilities. Ikinci (2014) reported that leaders need to be qualified with competencies and work experience to lead workers in attaining organizational goals and projected objectives. The existence of servant leadership through support increased the levels of employee satisfaction (McNeff & Irving 2017)). In addition, servant leadership through support enhanced worker retention and satisfaction (Kaur 2018). According to Brohi et al. (2018), workers' retention and satisfaction had a positive impact on workers' relationship with servant leadership. In a research by Young et al. (2018), it was observed that workers' commitment to organization objective

helped in employee retention and engagement. Consistent with these authors, Declercq et al. (2014) reported that servant leadership support created desired feelings and enhanced job engagement between workers and employers.

Additionally, DeConinck & DeConinck (2017) reported that servant leaders support workers by helping them to have a caring and ethical work climate, which can largely increase their productivity at the work place. It is thus vivid that the importance of servant leadership through support cannot be underestimated in organizations. Organizational support is a critical aspect that assists workers to attain their set goals (Halbeslem & Wheeler 2015). This means that workers are able to realize that employees care about them and the work they do, hence they satisfy their social needs (Sihag & Sarikwal 2015). This is consistent with research conducted by Chiniara & Bentein (2016) informed that the more a leader by servant leadership, the more will be their subjects socially and psychologically satisfied. When servant leaders serve others, they transcend personal interests for the benefit of their subjects Parris & Peachey (2013). In another study, Sipe & Frick (2015) reported that servant leaders through support exercise acceptance, tolerance and accept other persons' weaknesses.

Devi (2017) observed that employee engagement led to enhanced organizational financial output. Consistent with him, was Kazimoto (2016) who reiterated that employee engagement led to great profit and benefits to an organization. Leaders who give support to workers prioritize their followers' needs as opposed to their individual needs (Newman 2017). According to Van Dierendonck & Patterson (2015), assisting employees includes giving interpersonal support. Similar views were affirmed by Jones (2012). It is therefore crucial that servant leaders need to support their subjects for the well-being of their organizations, learning institutions, in this context. Aguenza & Som (2012) informed that the techniques to support workers' commitment to led to successful organizational outcomes.

Servant leaders support workers by understanding their human character and embrace nurturing attitude that builds their self-esteem. Such leaders recognize team work, which multiplies effectiveness and momentum in leadership. Apart from Spears' thought, Serrat (2009) posits that servant leadership is about moving people to higher levels of individual as well as communal self-awareness. In addition, he argues that the principal tenet is duty of the leader to serve followers and his or her key role is to develop, enable and support team members. This implies that servant leaders should support workers fully to develop their potentials and in order for them to deliver their best at their place of work, provides creative and supportive pathways toward fostering goal attainment in institutions. Energies are therefore focused on provision of necessary support and resources to employees.

Servant leaders lead their institutions by intuitively making sound decisions on behalf of their institutions (Weaver et al. (2014). Spears (2010) asserts that servant leaders support their followers to grow both professionally and personally. According to Amah (2015), servant leaders must be ready to serve others from their hearts. Drury (2004) categorically states that servant leaders have supportive roles as coaches and mentors to their subjects. In addition, she argues that when employees perceive behavior in their managers, supervisors and top leaders, that is similar to coaches or mentors, they will also identify the characteristics of servant leaders in their institutions and practice them to their advantage. Spears, (2014) noted that servant leaders

support persons at work by identifying those who are hurting and assisting them as much as possible. They, in addition, support workers to grow from the yeast of their failures. The supporting role of servant leadership, therefore, helps to ensure that followers have relational and structural support needed to carry out their responsibilities. It was against this background that the researcher sought to carry out a study on Assessment of Servant Leadership through Support: A case of Central Kenya Conference Secondary Schools, whose objective was to determine administrators' awareness and practice of Servant Leadership style through support in Central Kenya Conference SDA secondary schools.

Objectives of the study
1. To assess the profile of school administrators and teachers based on the following; gender, age work experience and educational qualification?
2. To determine administrators' awareness and practice of Servant Leadership style through support in Central Kenya Conference SDA secondary schools.

Hypothesis of the study
There is no significant difference between the evaluation rating of male and female teachers on the principals' practice of servant leadership.

2. Methodology

This research was carried out using a descriptive-comparative research design. Descriptive research describes phenomena associated with or characteristic of a subject population. The focus in this study was the practice of servant leadership by secondary school principals. According to Orodho (2003), descriptive survey research design is a method of collecting information by interviewing or administering questionnaire to a sample of individuals, which was the case for this study. Comparative research design was also used as it compares in quantitative terms the perceptions of groups of teachers on their principals' practice of servant leadership through service, support as manifested through various attributes listed in the questionnaire. The study targeted principals and teachers of both sexes, who taught in 12 SDA Secondary schools in Central Kenya Conference of Seventh-day Adventists. Six schools were selected for this study. The choice of Central Kenya Conference schools was done purposively because this sample is appropriate to this kind of study. Sampling technique allows a researcher to use cases that have needed information with respect to the objectives of the study. The sample size was eighty-two (82) teachers and six (6) principals. The researcher used a self-constructed questionnaire because it gathers data over a large sample, it upholds confidentiality, it saves on time, and it does not give opportunity for interviewer biasness. Questionnaires are commonly used to obtain important information about a given population.

The questionnaires were of two types. The first was designed for Administrators (Principals of selected schools), while the other set of questionnaires was meant for teachers. The administrators' instrument had three sections. Section 1 was the demographic information of respondents. Section 2 had closed ended questionnaire items where respondents were required to choose by circling one answer from the four choices given to show the extent to which they agreed or disagreed with listed statements in relation to their awareness of servant leadership as follows: 4- Agree 3- Tend to Agree 2- Tend to Disagree 1- Disagree. Section 3 comprised of questionnaire items which required respondents to circle one number that indicated their leadership in relationship to servant leadership: 1- Never 2- Rarely 3- Sometimes 4- Always.

The Teachers' Questionnaires had 3 sections. Section one required respondents to fill in their demographic information. Section 2 had closed-ended questionnaire items which required them to choose from among the four alternatives provided as follows: 4- Agree 3- Tend to Agree 2- Tend to Disagree 1- Disagree. This section was meant to establish to what extent the Principals of SDA Secondary schools in Central Kenya Conference practice Servant Leadership through Support. The validity of the questionnaire was established through consultations with professionals in the School of Education of the University of Eastern Africa, Baraton. The advice from experts was used by the researcher to improve on the quality of the questionnaires. After the return of pilot questionnaires, responses were subjected to a statistical treatment using the Cronbach's Alpha Coefficient. The sets of questionnaires for teachers yielded a reliability coefficient of 0.938, which was acceptable according to universal research standards. The researcher obtained an Ethics clearance letter from the Research Ethics Committee of the University of Eastern Africa, Baraton which was used to secure research permit from the National Council for Science and Technology (NACOST).The other permission was obtained from the Director of Education, Central Kenya Conference of Seventh-day Adventists. With a permit and permission from CKC Education Director, the researcher proceeded to the field for data collection.

The researchers carried out the actual study by taking the sets of questionnaire personally to relevant schools in order to save time and maximize the return rate of questionnaire. Prior to administration of questionnaire, the researcher gave a brief introduction to the study and clearly explained to respondents the purpose of the study and the need for their co-operation in the exercise. In addition, the researcher assured respondents that their responses would be treated confidentially. Questionnaire was then administered on the spot. The return rate for administrators' questionnaires was 100 % and that of teachers was 78.72 %. On average, the return rate of all administered questionnaire was 89.36 %. Generally, this return rate was good and would be relied upon in the findings. Descriptive statistics was used to analyze data. Descriptive statistics used measures such as means and standard deviations and present findings in form of tables, percentages and graphs and was done using the SPSS package, Version 21. Inferential statistics (t-test) was used to test the null hypothesis formulated in the study.

3. Results and Discussion

Research question 1: *What is the profile of respondents?*

Six Central Kenya Conference SDA secondary schools took part in the study. All selected schools were of mixed type. The greatest number of SDA schools were of mixed sexes were boarding in nature. This is commendable because young people are supposed to be exposed to both sexes as they grow in order to learn how to co-exist with the people of opposite sex.
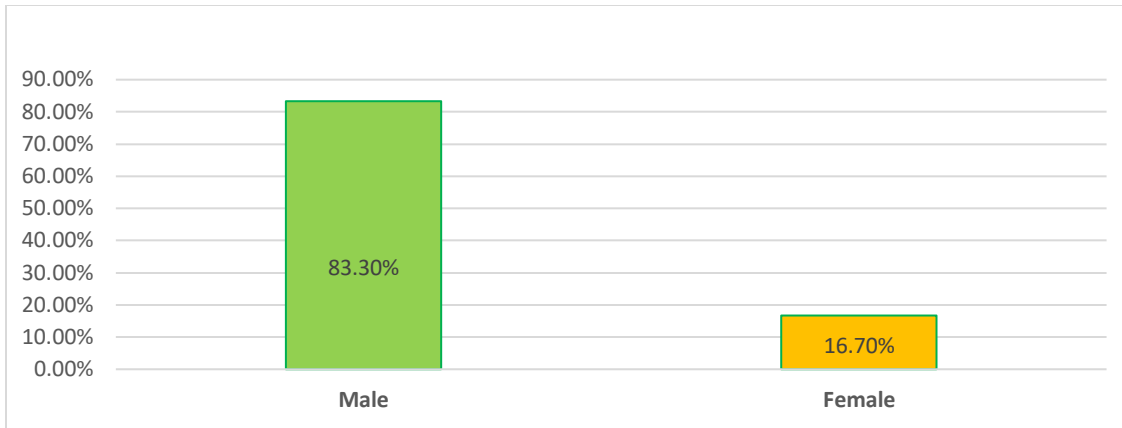
Figure 1: Gender of school administrators   N=6

Table 1 shows that out of the six administrators, 5 (83.3%) were males and one female administrator (16.7%). This finding implies that there were more men in the administration of Adventist Secondary schools. The reason could be the general trend in across cultures that men are expected to lead as women follow, which is consistent with Kent and Moss (1994), whose study supports universal trend that masculine subjects were the most likely to emerge as leaders. The world has changed and it is important that women reassert themselves and take leadership positions in the society as it is advocated by the new constitution of Kenya; "Not more than 2⁄3 of the members of elective bodies shall be of the same gender" Constitution of Kenya (2010 Ed). The change is important in that it lays a platform for equality of all people which God expects. In addition, this change provides opportunities for women to make use of their leadership potentials (Kiamba, 2008).
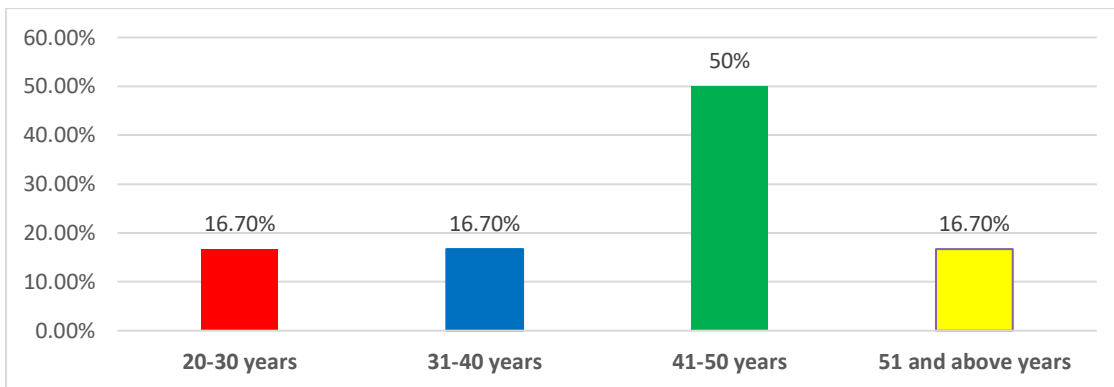
Figure 2: Age bracket of school administrators   **N=6**

Regarding the age of administrators figure 2 shows that 3 (50%) were aged 41-50 years old. 1 (16.7%) was between 20-30 years, 1 (16.7%) was 31-40 years old and the same, 1 (16.7%) was 51 and above years of age. This implies that leadership in SDA Secondary schools has higher concentration of those aged between 41 and 50 years of age. This trend differs from other countries in the world like U.S.A, Rwanda and Central Europe, where leadership roles are assumed by the younger generation. The trend could be that it is generally believed in Africa, the leadership is for the elderly in the society. However, Melchear and Bosco noted that servant leadership style can be practiced by any adult age group irrespective of age.
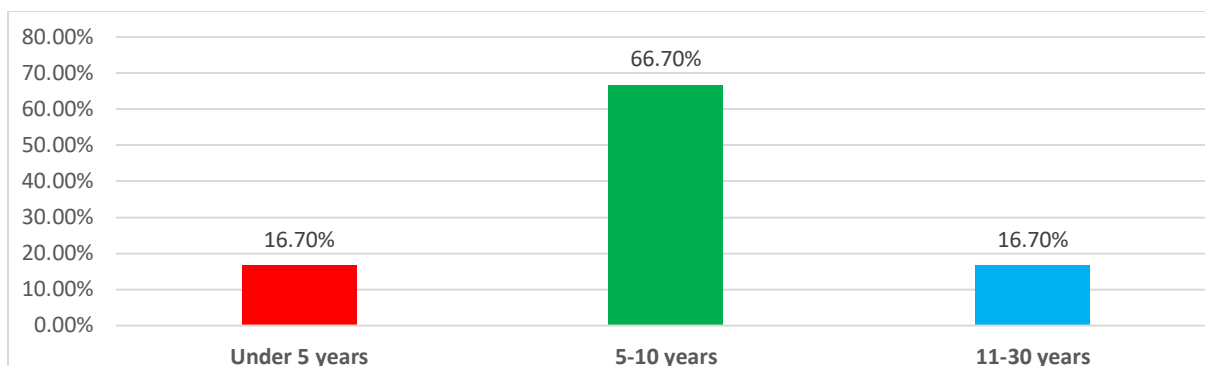
Figure 3: Work experience of school administrators   **N=6**

Figure 3 revealed that the work experience of administrators was; 4 (66.7%) of administrators had worked for between 5-10 years. Each, (16.7%) had worked for under five years and between 11-30 years respectively. No teacher had served for above 30 years. In terms of educational administration, these observations imply that Principals in SDA secondary school have a tendency of working for a short period (5-10 years) then move to other stations. It is therefore important for the CKC to find ways of retaining Principals longer for better growth of these institutions.
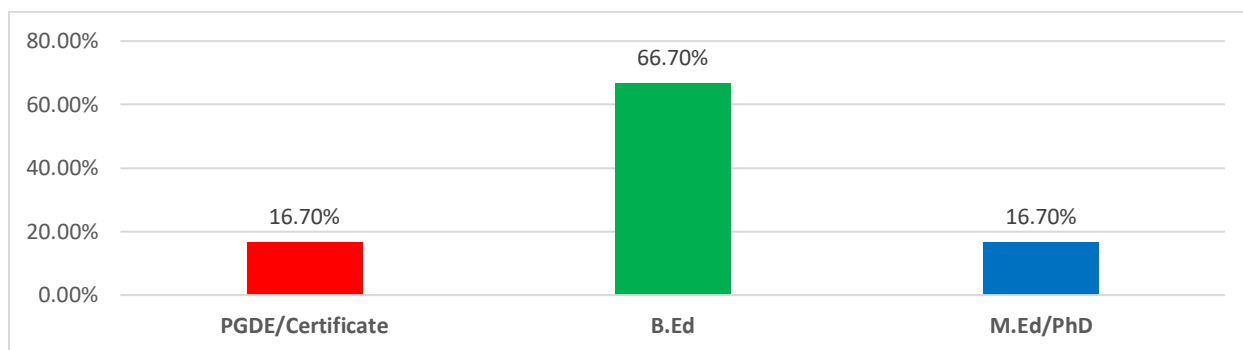
Figure 4: Education qualifications of administrators   N=6

On educational qualifications of administrators, it was credible to note from figure 4 that 4 (66.7 %) had Bachelor of Education degrees; One (16.7%) had Postgraduate Diploma and Master's degree qualifications respectively. On attendance of leaderships workshops, 6 (100%) of the administrators indicated that they have attended several leadership workshops. This implies that SDA Secondary schools have trained and well qualified teacher- leaders. . This is strength to be upheld by the CKC education leadership.

Demographic information of teachers

Table 1. *Gender of teachers*

Gender	Frequency	Percentage
Male	44	53.7
Female	38	45.3

N=82

Table 1 indicates that out of the 82 teacher- respondents, 44 (53.7%) were males, whereas, 38 (46.3%) were females. These findings imply that just like with principals there were more male teachers in Central Kenya Conference Secondary schools compared to female counterparts. This could be as a result of the higher levels of literacy among men compared to women in recent past. Time has changed and there is need to look into this gender disparity in teacher employment in SDA schools and enhance girl child education in order to promote teacher-leader in administration of SDA schools. This finding however, contradicts Barbuto et al. (2007) findings that male as well as female servant leaders equally and effectively utilized servant leadership style in their institutions.

Table 2. *Age bracket of teachers*

Age bracket	Frequency	Percentage
20-30	27	32.9
31-40	49	59.8
41-50	5	6.1
51 and above	1	1.2

N=82

From the analysis of data as shown in table 2 shows that most, 49 (59.8%) fell in the age bracket of 31-40, 27 (32.9%) in the bracket of 20-30, 5 (6.1%) in age bracket 41-50 and only 1 (1.2%) was above 51 years. These results imply that the largest number (59.8%) of teachers in CKC SDA secondary schools were middle aged, while the smallest number was above 51 years of age, which is a naturally expected trend.

Table 3. *Work experience of teachers*

Work experience	Frequency	Percentage
under 5 years	27	32.9
5-10 years	44	53.7
11- 30 years	11	13.4
Total	82	100

N=82

As for work experience, table 3 indicates that 27 (32.9%) teachers had worked for 5 years and below. The largest number, 44 (53.7%) had worked for 5 to 10 years while a small proportion, 11 (13.4%) had worked for 11 to 30 years. There is no teacher who has worked in their school for 31 years and above.
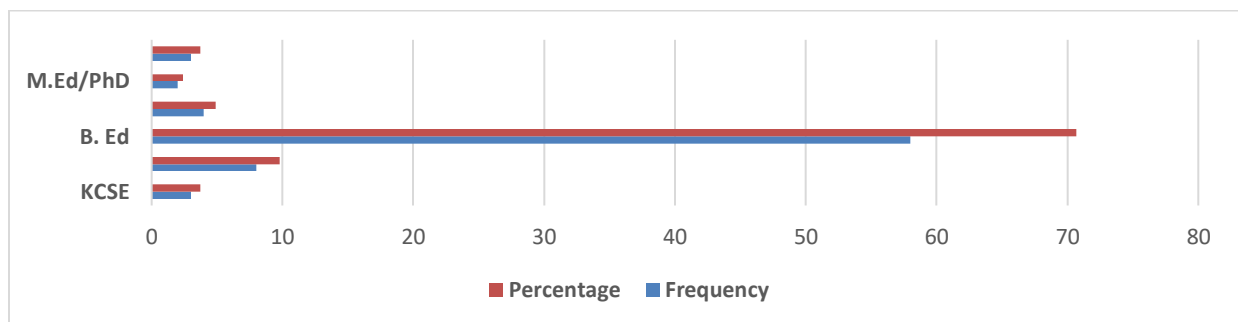
Figure 5. Education qualifications of teachers

It was significant to note as shown in table 5 that a large proportion, 66 (80.6%) of teachers in Central Kenya Conference SDA Secondary schools were trained and qualified to teach in secondary schools, as required by the Ministry of Education of Kenya. Fifty eight (70.7%) were Bachelor of Education degree holders. Eight (9.8%) were Diploma holders. KCSE holders were 3 (3.7%), PGDE holders were 4 (4.9%). There were 2 (2.4%) teachers who held a master's degree. Three (3.7%) teachers showed that they are trained in other areas like Bachelor of Science. However, it is, therefore, important to note that schools in Central Kenya Conference have well trained and qualified school teachers.

Table 5. *Teachers' perceptions of principals' practice of servant leadership through support*

	Statement	$\bar{x}$	s
1	My principal has a caring personality	2.45	1.12
2	My principal encourages me when I am discouraged	2.38	1.03
3	My principal supports me when need arises	2.45	0.97
4	My principal has best interests of workers in mind	2.43	1.11
5	My principal helps me in difficult times	2.35	1.07
6	My principal guides and keeps me on track when I err	2.43	1.06
7	My principal has confidence in me	2.44	1.07
8	My principal recognizes my unique abilities	2.47	1.06
9	My principal challenges me to develop my full potential	2.39	1.07
10	My principal gives me a second chance when I err	2.49	0.99
11	My principal gives me time to grow without coercing me	2.47	1.05
12	My principal is an inspiration to me	2.31	1.05
13	When I have challenges at work, I am free to share them with My principal	2.22	0.99
	Average	**2.40**	**0.87**

N=82

Table 5 shows the highest $\bar{x}$ = 2.49. Teachers at that $\bar{x}$ indicated "My Principal gives me a second chance when I err". This mean implies that CKC SDA secondary schools teachers tend to disagree that principals are patient with those who make mistakes; which should not be the case. The other mean score was 2.47 "My Principal gives me time to grow without coercing me". This mean implies that still, teachers tend to disagree that principals give them time to grow without coercing them. The same $\bar{x}$ =2.47 was generated by responses to "My Principal recognizes my unique abilities, which is another unfortunate aspect to have in CKC SDA secondary schools.

"My Principal has a caring personality" yielded $\bar{x}$ = of 2.45. A similar mean was generated by teachers on: "My principal supports me when need arises". This mean shows that teachers tend to disagree to the facts that their principals have a caring personality and support them when needs arise. This is a negative implication on the part of these principals. The attribute, "My Principal has best interest of workers in mind" had $\bar{x}$=2.43. "My Principal guides and keeps me on track when I err"; had $\bar{x}$ =2.43. This means teachers tend to disagree that principals guide and keep them on track when they err and it also implies that principals rarely have best interests of workers in mind. They therefore need to improve on these aspects. The variable, "My principal

has confidence in me had $\bar{x}$=2.44 and meant that according to teachers, principals tend not to have confidence in them. This shows that principals lack confidence in their teachers in CKC SDA secondary schools, an unexpected trend.

The lowest $\bar{x}$ =score was 2.20, generated by responses on "When I have challenges at work, I am free to share them with my Principal". This implies that teachers are reluctant to share their work challenges with their Principals; which should not be the case. This may be because they do not have trust that they can get assistance from their leaders. This low mean was not consistent with Spears (2004) who noted that servant leaders support persons at work by identifying those who are hurting and assisting them as much as possible. A mean score of 2.39 was generated by teachers on, "My principal challenges me to develop my full potential". "My principal is an inspiration to me" generated $\bar{x}$ =2.31, implying that principals tend not to inspire teachers in CKC SDA secondary schools. The overall mean score on this aspect of assessment was 2.40. This means principals rarely challenge teachers to develop their full potentials and teachers tend to disagree that principals practice servant leadership style in CKC SDA secondary schools.

Comparison by Gender

Table 5 shows the outcome of the hypothesis on differences on the perceptions male and female on the practice of servant leadership through support in the institutions under considerations. It had been hypothesized that there *is no significant difference between the evaluation rating of male and female teachers on the principals' practice of servant leadership.* Table 5 shows the output when the t-test was statistically computed.

Table 5. *T-test output on the evaluation rating of male and female teachers*

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Leadership through support	Equal variances assumed	2.333	.131	1.084	80	**.282**
	Equal variances not assumed			1.071	73.001	.288

The t-test for equality of means generated sig. (2-tailed) of .282 for leadership through support Since *p*>0.05 for all the three cases, thus, there *is no significant difference between the evaluation rating of male and female teachers on the principals' practice of servant leadership.* Male and female teachers have similar evaluation of their principals' practice of servant leadership in all areas.

4. Conclusions and Suggestions

The following conclusions were drawn from the findings of this study: - Concerning demographic information of principals, there were more (83.3%) male principals in CKC SDA secondary schools than their female (16.7%) counterparts. Principals in CKC SDA secondary schools did work at the same station for a long period of time; (66.7%) had stayed for a period of 5-10 years. Principals in CKC SDA secondary schools were well trained and qualified to lead their institutions; (66.7%) had Bachelor of Education degree. CKC Education Department was sensitive and promoted principals' leadership workshops; (100%) had attended these leadership workshops significantly. On teachers' demographic information, there tend to be gender balance in CKC SDA schools teacher employment, because (53.7%) were males and (46.3%) were females. Majority, (59.8%) of teachers in CKC SDA secondary schools were middle aged. However, other age groups were represented from 20 to 50 years. Teachers in CKC SDA secondary schools had required qualifications to teach in their schools, except for (7.4%) of teachers who had KCSE and Bachelor of Science degree qualifications, which are not recognized by the Teachers' Service Commission of Kenya. CKC Education department, on average, sponsored teachers for workshops. On teachers' evaluation on principals' practice of servant leadership style in CKC SDA secondary schools through support, the teachers' evaluation rating revealed that principals in CKC SDA secondary schools rarely practice servant leadership style through support. On significance difference in the perception of teachers on principals practice of servant leadership style in CKC SDA secondary schools through support based on Gender, Age and teaching experience; Gender, age, and teaching experience did not affect the evaluation rating of teachers on CKC secondary school principals' practice of servant leadership style through support as they have similar evaluation across categories.

5. Conflict of interest

The author declares that there is no conflict of interest.

6. Ethics committee clearance

The author confirms that the study does not require ethics committee approval according to research integrity guidelines in their country.

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AN INVESTIGATION OF ENVIRONMENTAL LITERACY LEVELS AND ENVIRONMENTAL POLLUTION IMAGES OF 7TH YEAR PUPILS IN PRIMARY EDUCATION [1]

Research article

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AN INVESTIGATION OF ENVIRONMENTAL LITERACY LEVELS AND ENVIRONMENTAL POLLUTION IMAGES OF 7TH YEAR PUPILS IN PRIMARY EDUCATION

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Abstract

Environmental education is defined as raising self-sacrificing people with an awareness of all kinds of problems and solutions to create a more sustainable environment. Environmental literacy is essential in environmental education. The concept of environmental literacy means having a good education in the field of the environment and a high level of knowledge about the environment.

This research is a descriptive study examining the environmental literacy levels and environmental pollution images of 7th grade pupils in primary education. The study was conducted with 76 pupils in four classes of a public secondary school in the city of Ankara in the 2018-2019 academic year. 35 (46.1%) female and 41 (53.9%) male pupils participated in the study.

The Environmental Literacy Scale, the Environmental Sensitivity Scale, the Environmental Behaviour Scale, and the Cognitive Skills Interview Form developed by Sontay, Gökdere, and Usta (2015) were used in the study. In addition, the pupils were asked to draw environmental pollution themed pictures in order to explore their images of environmental pollution. The drawing method was used to reveal the pupils' perceptions about environmental pollution.

Keywords: environmental literacy, environmental behaviour, environmental sensibility, environmental problems, environmental education, image of environmental pollution

1. Introduction

The habitat in which humans and other living beings engage in interaction and pursue all their social, cultural, physical, and biological activities throughout their lifespan is defined as the environment (Daştan, 1999; Seçgin, Yalvaç, and Çetin, 2010). Humans having a such an interaction with the nature continually use the resources in the natural environment. Day by day, humans are using up environmental resources more and more rapidly on an incredible scale and, wittingly or unwittingly, causing much damage to the environment in which they live. This rapid increase in the use of environmental resources leads to a wide range of environmental issues (Borden, 1985).

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Environmental pollution is defined as damage caused to the air, water, and soil by pernicious substances that negatively affect the health of all living beings, doing material harm to them and leading to structural damage (Çepel, 2003). The literature in this field makes reference to a great deal of environmental pollution issues such as air, water, and soil pollution, the danger of extinction of animal and plant species, industrial and nuclear waste, food pollution, garbage, noise pollution, the thinning of the ozone layer, climate change, natural disasters, global warming, radioactive pollution, communicable diseases, and chemical pollution (Erten, 2005; Beyhun et al., 2007; Smyth, 1995). Moreover, in line with the world's population growth, these issues are aggravated by the increase in human needs and the senseless use of natural resources.

The damage that we cause to our environment has an impact not only on our own habitat but on the whole universe (Erten, 2005). This highlights the necessity to tackle environmental problems on a more universal scale. For this reason, environmental studies are conducted on the international platform and a common environmental consciousness is targeted. The workshop held as part of the Stockholm Conference organized by the United Nations in 1972 could be an example of this (UNESCO, 1977). Research highlights humans' environmental consciousness as the most basic factor in environmental issues (Kıyıcı et al., 2005). Environmental consciousness is undoubtedly vital for humans protecting their environment and fulfilling their responsibilities in this context. Environmental education is a key element in raising environmentally conscious individuals (Geray, 1992). It has been emphasized on many platforms that environmental problems can be prevented first and foremost through environmental education (Soran, Morgil, Atav, and Işık, 2000; Altınöz, 2010; Pooley and O'Connor, 2000; Stevenson, 2007; Alım, 2006; Dunlap and Liere, 1978; UNESCO, 1979). Environmental education is aimed at raising individuals' environmental knowledge levels and making a positive change in their attitudes towards the environment as well as turning these attitudes into behaviours in the individual (UNESCO-UNEP, 1977). Making humans environmentally sensitive and conscious so that they leave a clean environment to future generations forms the foundation of environmental education (Doğan, 1997; Erten, 2005). Environmental education in the 21st century not only improves environmental knowledge and sensitivity but also supports individuals' environmental attitudes and behaviours (Atasoy and Ertürk, 2008).

Environmental literacy is one of the most important objectives of environmental education (Disinger and Roth, 1992; Hungerford, Peyton, and Wilke, 1994; Iozzi, Laveault, and Marcinkowski, 1990). The concept of environmental literacy was introduced by Charles Roth and defined as an individual's total amount of knowledge about the environment and level of awareness of environmental problems (Roth, 1968). Environmental literacy is currently defined as noticing the present state of the environmental balance, restoring the broken balance in the environmental system, and planning for a better environmental order (Disinger and Roth, 1992; Balkan Kıyıcı, 2009). Environmentally literate individuals are those who are sensitive to the environment and who can also provide solutions to environmental problems (NAAEE; 2000).

Roth (1992) suggests that environmental literacy is based upon four factors – knowledge, skills, sensitivity, and behaviour. In the literature (Harvey, 1976; Hungerford and Peyton, 1994; Roth 1992; UNESCO, 1978), these four factors of environmental literacy are defined as follows:

a. Knowledge in Environmental Literacy: One of the main factors of environmental literacy, knowledge is not just about knowing what environmental literacy means. This aspect also includes all knowledge of environmental problems and solutions, ecological advances, and nature in general.

b. Skills in Environmental Literacy: The solutions that environmentally literate individuals provide for environmental problems.

c. Sensitivity in Environmental Literacy: Environmentally literate individuals' sensitivity to environmental issues and consideration of environmental conditions for the elimination of those issues.

d. Behaviour in Environmental Literacy: Environmentally literate individuals' personal involvement in the solution of environmental problems and engagement in environmental activities (Roth, 1992).

The literature includes many studies on environmental literacy (Cheong, I. P.–A. 2005; Bergman, 1995; Fah, and Sirisena, 2014; Karatekin, 2011; Digby, 2010; Yavetz, Goldman, and Pe'er, 2009; Negev, Sagy, Garb, Salzberg, and Tal, 2008; Murphy, and Olson, 2008; Coyle, 2005; Wang, 2014; Karatekin and Aksoy, 2012; Altınöz, 2010; Teksöz, Şahin, and Ertepınar, 2010; Erdoğan, 2009; Kışoğlu, 2009; Owens, 2000; Marcinkowski and Rehrig, 1995; Simmons, 1995; Roth, 1992). These studies investigate environmental literacy levels with different implements of measurement, from different aspects, and based on different variables.

In the planning of environmental education and the process of environmental consciousness-raising in individuals, it is crucial to identify their existing knowledge of the environment, their levels of environmental literacy, and their perceptions of environmental pollution. The present study investigates the environmental literacy levels of 7th year pupils in primary education and their images of environmental pollution.

2. Method

This research is a descriptive study investigating primary education pupils' environmental literacy levels based on different variables and identifying their environmental pollution images. The research data was collected through quantitative and qualitative techniques. The study was carried out with 76 pupils in four different classes of a public secondary school in the city of Ankara. 35 (46.1 %) female and 41 (53.9 %) male pupils participated in the study. The sampling methods of easy access and maximum variety were used. All classes of a school were examined in the study, including pupils with different levels of knowledge, which ensured variety (Erdoğan, 1998; Yıldırım and Şimşek, 2006).

The Environmental Literacy Scale developed by Sontay, Gökdere, and Usta (2015) was used in the study. This scale is a combination of four different scales about the knowledge, skills, sensitivity, and behaviour components of environmental literacy. The study also made use of the Environmental Sensitivity Scale, Environmental Behaviour Scale, and Cognitive Skills Interview Form, which had their validity and reliability ensured.

The Environmental Sensitivity Scale is a five-step likert type scale of 15 items designed to identify secondary school pupils' inclinations of sensitivity towards the environment. It contains items measuring individuals' sensitivity to the environment and environmental problems as well as their ability to consider social structures in decision-making and responsible behaviour displaying processes. The scale presents respondents with choices between 'Strongly Agree' and 'Strongly Disagree'. The exploratory factor analysis by Sontay et al. (2015) concludes that the scale has a three-factor structure. In line with the sensitivity component, the scale includes the sub-dimensions of environmental responsibility (items 1, 9, 10, 13, 14), environmental sensitivity (items 2, 6, 7, 11, 15), and environmental perception (items 3, 4, 5, 8, 12). Sontay et al. (2015) found that the measurement reliability of the scale was 0.860.

The Environmental Behaviour Scale is a seven-step Likert type scale of 12 items designed to identify pupils' behaviours towards the environment. The pupils were asked to mark how many times they had done the actions stated up until then. The scale has three sub-dimensions of protective behaviour for natural balance (items 6, 8, 9, 13), social behaviour (items 1, 3, 10, 11, 15), and advanced cognitive behaviour (items 2 and 5). Sontay et al. (2015) found that the measurement reliability of this scale was 0.773.

Another data collection tool used in the study was the Cognitive Skills Interview Form composed of three sub-dimensions of pupils identifying environmental issues, pupils analysing these issues and pupils devising an action plan for these issues. In this context, the pupils were asked three open-ended questions. Using the structured open-ended interview approach, this form made it possible to both minimize the interviewer's bias and subjectivity and obtain the opinions of a lot of respondents (Yıldırım and Şimşek, 2008). The inter-coder reliability rate for the interview form was found to be 0.88 (Sontay et al., 2015).

The Environmental Knowledge Test, the Environmental Sensitivity Scale, the Environmental Behaviour Scale, and the Cognitive Skills Interview Form developed by Sontay et al. have been found to be valid and reliable scales that can be used in combination or separately in order to identify 6th to 8th grade secondary school pupils' environmental literacy levels. In this study, 7th year pupils' environmental literacy levels were explored by means of the Environmental Sensitivity Scale, the Environmental Behaviour Scale, and the Cognitive Skills Interview Form. In addition, another form was used to collect the pupils' demographics such as gender and parents' education levels.

In the second part of the study, the pupils' environmental pollution images were identified. To this end, the pupils were given drawing paper and crayons and asked to draw about environmental pollution. The drawing method was used to reveal the pupils' environmental pollution images. Dove, Everett, and Preece (1999) claim that the drawing method can be used to reveal individuals' perception levels. In this process, the pupils' use of drawing paper and crayons was not limited in any way; they were free to use crayons, felt-tipped pens, or pencils as they wished. The pupils were given two class hours for the drawing. They were not led in any way about what they could draw. Their environmental pollution themed drawings were analysed by two assessors. The analyses made use of a theme-specific code list designed by an environmental engineer as a field expert. This code list, which had been designed prior to data analysis, was improved by the researchers, in line with the expert's opinions, during the analyses. Preliminary standardization work was carried out to ensure inter-assessor consistency whereby the same drawings were first analysed by the assessors individually who then came together to discuss the differences in their analyses. The pupils' drawings were independently analysed by two assessors. Following these analyses, those drawings with discrepancy in the coding were re-examined by the assessors who sought to come to an agreement on their coding.

3. Findings

3.1. Study Group

The study group was composed of 7th year pupils in four different classes at a public secondary school in the city of Ankara. The demographics of the participants are presented in Table 1.

Table 1. *Demographics of the Study Group*

		n	%
Gender	Male	41	53,9
	Female	35	46,1
Mother's Education	Primary school	2	2,7
	Secondary school	4	5,3
	High school	15	20,0
	Vocational school	2	2,7
	Bachelor's degree and more	52	69,3
Father's Education	Primary school	-	-
	Secondary school	-	-
	High school	13	17,3
	Vocational school	2	2,7
	Bachelor's degree and more	60	80,0

76 seventh grade pupils took part in the study. Of those, 41 (53.9 %) were male and 35 (46.1 %) were female. In the study group, most of the pupils' mothers were found to hold a bachelor's degree or more (n=52, 69.3%). This was followed by the high school certificate (n=15, 20%). As for the fathers, 60 out of 76 (78.9%) held a bachelor's degree or more, 13 (17.1%) held a high school certificate, and 2 (2.6%) held a vocational school diploma.

3.2. Findings on the Environmental Sensitivity Scale

The pupils' responses to the items in the Environmental Sensitivity Scale, designed to identify pupils' environmental sensitivity inclinations, are presented in Table 2. The Cronbach Alfa reliability factor for the Environmental Sensitivity Scale measurement in this study was found to be 0.801.

Table 2. *Distribution of the Responses to the Items in the Environmental Sensitivity Scale*

	Item	Strongly agree	Agree	Slightly agree	Disagree	Strongly disagree
1	In order to prevent environmental pollution, I warn those who behave in a harmful way to the environment.	39 (%51,3)	23 (%30,3)	14 (%18,4)		
2	I have the necessary sensitivity to the plant and animal species around so that they receive no harm.	49 (%64,5)	23 (%30,3)	4 (%5,3)		
3	I know what measures to take to prevent environmental pollution.	45 (%60)	26 (%34,7)	4 (%5,3)		
4	I consider myself capable of informing people on why natural resources need to be carefully protected.	33 (%43,4)	16 (%21,1)	21 (%27,6)	5 (%6,6)	1 (%1,3)
5	I can make conjectures on potential harm by landslides.	31 (%40,8)	28 (%36,8)	15 (19,7)	1 (%1,3)	1 (%1,3)
6	I believe that more sensitivity is needed towards endangered plant and animal species.	57 (%77)	12 (%16,2)	5 (%6,8)		
7	When buying a product, I check for the recycling logo (♻) to prevent environmental pollution.	17 (%22,4)	17 (%22,4)	25 (%32,9)	8 (%10,5)	9 (%11,8)
8	I consider myself adequately informed on at least one environmental problem.	44 (%57,9)	26 (%34,2)	5 (%6,6)	1 (%1,3)	
9	In cooperation with the relevant authorities, I would like to put forward solutions to environmental problems and engage in such activities.	26 (%34,2)	14 (%18,4)	23 (%30,3)	10 (%13,2)	3 (%3,9)

10	I am willing to engage in more tree-planting activities in order to prevent landslides.	44 (%59,5)	15 (%20,3)	9 (%12,2)	4 (%5,4)	2 (%2,7)
11	I am sensitive to the harmful effects of human activity in the natural habitats of living beings.	44 (%58,7)	22 (%29,3)	9 (%12)		
12	I consider myself as someone who protects natural landmarks and collaborates with others for their permanence for future generations.	32 (%42,1)	24 (%31,6)	13 (%17,1)	6 (%7,9)	1 (%1,3)
13	I am willing to take responsibility to help anyone working towards a solution to environmental issues.	29 (%38,7)	29 (%38,7)	14 (%18,7)	3 (%4)	
14	I would like to persuade people to do something to protect the environment and also do my share.	35 (%46,1)	27 (%35,5)	14 (%18,4)		
15	Whenever I see a polluted water source, walk around in smog, or come upon garbage, I think about the importance of keeping the environment clean and protecting it for our lives.	43 (%56,6)	20 (%26,3)	9 (%11,8)	4 (%5,3)	

The responses suggest that the pupils mostly gave positive answers to the items. For instance, 81.6% of them responded that they warned those who behaved in a harmful way to the environment. 94.8% of them indicated that they had the necessary sensitivity to the plant and animal species around so that they received no harm. 94.7% of them said that they knew what measures to take to prevent environmental pollution.

The minimum score that can be obtained on the Environmental Sensitivity Scale is 15 and the maximum score is 75. As for the sub-dimensions of the scale (environmental responsibility, environmental sensitivity, and environmental perception), the minimum and the maximum scores that can be obtained are 5 and 25 for all sub-dimensions. The average of the total scores that the study group obtained on the items of the scale was 62.91 (min=44; max=75; df=7.37). The average scores for the sub-dimensions of environmental responsibility, environmental sensitivity, and environmental perception were found to be 20.50 (min=11; max=25; df=3.42), 21.25 (min=14; max=25; df=2.45), and 21.16 (min=12; max=25; df=2.88), respectively. The data on the Environmental Sensitivity Scale, both as a whole and in its sub-dimensions, suggests that the pupils who took part in the study are sensitive to the environment and environmental issues, are willing to take responsibility, and also behave responsibly towards the environment.

The Kolmogorov-Smirnov normality test was conducted to check for a normal distribution of the total scores and the sub-dimension scores on the Environmental Sensitivity Scale. The

test results no indicate a normal distribution of the data (p<.05). Therefore, in this study, the non-parametric Mann-Whitney U and Kruskal-Wallis tests were used for data analysis.

The Mann-Whitney U test was conducted to determine whether the pupils' Environmental Sensitivity Scale total scores and sub-dimension scores had any relation to gender. The Mann-Whitney U test results for the Environmental Sensitivity Scale total and sub-dimension average scores in relation to gender are presented in Table 3.

Table 3. *Mann-Whitney U Test Results for the Pupils' Environmental Sensitivity Scale Scores and the Gender Variable*

	Gender	n	$\overline{X}$	Rank average	Rank total	U	z	p
Environmental Responsibility Sub-dimension	Female	35	21,49	44,46	1556,00	509,000	-2,183	,029
	Male	41	19,66	33,41	1370,00			
Environmental Sensitivity Sub-dimension	Female	35	21,54	41,83	1464,00	601,000	-1,225	,220
	Male	41	21,00	35,66	1462,00			
Environmental Perception Sub-dimension	Female	35	21,46	40,89	1431,00	634,000	-,877	,381
	Male	41	20,90	36,46	1495,00			
Environmental Sensitivity Scale Total Score	Female	35	64,49	42,76	1496,50	568,500	-1,555	,120
	Male	41	61,56	34,87	1429,50			

The Mann-Whitney U test results in Table 3 demonstrate a statistically significant difference (p<.05) between the male and female pupils, in favour of the girls, only in the environmental responsibility sub-dimension. No statistically significant difference was detected between the male and female pupils (p>.05) in terms of the Environmental Sensitivity Scale total scores, the environmental responsibility, and the environmental perception sub-dimension scores.

The Kruskal-Wallis test was conducted to determine whether the pupils' Environmental Sensitivity Scale total scores and sub-dimension scores had any relation to parents' education levels. The Kruskal-Wallis test results for the Environmental Sensitivity Scale total and sub-dimension average scores in relation to parents' education levels are presented below (Tables 4 and 5).

Table 4. *Kruskal-Wallis Test Results for Environmental Sensitivity Scale Total Scores and Sub-dimension Average Scores and the Mothers' Education Variable*

	Mother's Education	n	$\overline{x}$	Rank average	Chi square	df	P
Environmental Responsibility Sub-dimension	Primary school	2	19,00	36,75	5,359	4	,252
	Secondary school	4	19,00	25,63			
	High school	15	19,40	29,03			
	Vocational school	2	20,50	36,25			
	Bachelor's degree and more	52	20,92	41,65			
Environmental Sensitivity Sub-dimension	Primary school	2	21,5	39,25	1,301	4	,861
	Secondary school	4	20,5	27,00			
	High school	15	21,13	37,10			
	Vocational school	2	22	44,00			
	Bachelor's degree and more	52	21,31	38,83			
Environmental Perception Sub-dimension	Primary school	2	19	22,75	3,689	4	,450
	Secondary school	4	19,5	22,38			
	High school	15	21,13	36,47			
	Vocational school	2	21,5	40,50			
	Bachelor's degree and more	52	21,40	40,13			
Environmental Sensitivity Scale Total Score	Primary school	2	59,5	34,75	4,751	4	,314
	Secondary school	4	59	22,63			
	High school	15	61,67	31,10			
	Vocational school	2	64	37,75			
	Bachelor's degree and more	52	63,63	41,31			

Table 5. *Kruskal-Wallis Test Results for Environmental Sensitivity Scale Total Scores and Sub-dimension Average Scores and the Fathers' Education Variable*

	Father's Education	n	$\overline{X}$	Rank average	Chi square	df	P
Environmental Responsibility Sub-dimension	Primary school	-	-	-	3,547	2	,170
	Secondary school	-	-	-			
	High school	13	19,38	30,69			
	Vocational school	2	18	19,50			
	Bachelor's degree and more	60	20,77	40,20			
Environmental Sensitivity Sub-dimension	Primary school	-	-	-	2,370	2	,306
	Secondary school	-	-	-			
	High school	13	20,46	30,15			
	Vocational school	2	21	31,50			
	Bachelor's degree and more	60	21,43	39,92			
Environmental Perception Sub-dimension	Primary school	-	-	-	2,395	2	,302
	Secondary school	-	-	-			
	High school	13	21,23	37,85			
	Vocational school	2	18,50	14,75			
	Bachelor's degree and more	60	21,27	38,81			
Environmental Sensitivity Scale Total Score	Primary school	-	-	-	4,558	2	,102
	Secondary school	-	-	-			
	High school	13	61,08	30,12			
	Vocational school	2	57,50	15,75			
	Bachelor's degree and more	60	63,47	40,45			

The Kruskal-Wallis test results in Tables 4 and 5 demonstrate no statistically significant difference ($p > .05$) in the Environmental Sensitivity Scale total scores and the sub-dimension scores in relation to parents' education levels. In other words, parents' education levels are not a variable that affects pupils' environmental sensitivity levels.

3.3. Findings on the Environmental Behaviour Scale

The Environmental Behaviour Scale was implemented with the objective to assess the study group pupils' behaviours towards the environment. The pupils were asked to mark how many times they had realized the statements on the scale. The Cronbach Alfa reliability factor for this measurement was found to be 0.801 and the data from the scale are presented in Table 6.

Table 6. *Distribution of the Responses to the Items in the Environmental Behaviour Scale*

Environmental Behaviours	Never	1	2	3	4	5	More than 5 times
1. Amongst the people close to me, I have warned those who display behaviour that might be harmful to the environment.	3 (%4,3)	3 (%4,3)	1 (%1,4)	11 (%15,7)	14 (%20)	12 (%17,1)	26 (%37,1)
2. I have bought foodstuff bearing the organic product logo.	7 (%9,9)	9 (%12,7)	12 (%16,9)	7 (%9,9)	7 (%9,9)	8 (%11,3)	21 (%29,6)
3. I have planted trees, flowers, or other plants in order to protect the environment and its beauty.	4 (%5,6)	5 (%6,9)	12 (%16,7)	9 (%12,5)	12 (%16,7)	8 (%11,1)	22 (%30,6)
4. I have bought products bearing the recycling logo (♻) on them.	8 (%11)	9 (%12,3)	12 (%16,4)	14 (%19,2)	3 (%4,1)	7 (%9,6)	20 (%27,4)
5. I have volunteered for certain activities to protect the environment (e.g. signing up for membership for the Tema Foundation, taking part in school clubs about the environment).	23 (%31,5)	9 (%12,3)	14 (%19,2)	7 (%9,6)	13 (%17,8)	2 (%2,7)	5 (%6,8)
6. Of the issues threatening our world such as nuclear pollution, acid rain, and sea pollution, I have done research on at least one.	6 (%8,3)	13 (%18,1)	9 (%12,5)	15 (%20,8)	7 (%9,7)	9 (%12,5)	13 (%18,1)

7. In line with the laws and regulations in effect, I have cooperated with the authorities against those causing harm to natural landmarks.	40 (%55,6)	8 (%11,1)	4 (%5,6)	7 (%9,7)	3 (%4,2)	6 (%8,3)	4 (%5,6)
8. I have placed non-recyclable waste in garbage bins.	1 (%1,4)	-	4 (%5,5)	6 (%8,2)	6 (%8,2)	6 (%8,2)	50 (%68,5)
9. I have placed recyclable waste such as paper, glass, and plastic in recycling bins.	1 (%1,4)	1 (%1,4)	4 (%5,6)	3 (%4,2)	8 (%11,1)	11 (%15,3)	44 (%61,1)
10. I have developed practical, useful, and simple methods to keep the environment clean.	14 (%19,4)	14 (%19,4)	8 (%11,1)	12 (%16,7)	7 (%9,7)	8 (%11,1)	9 (%12,5)
11. I have put forward some suggestions to the authorities or my teacher concerning the protection of endangered species.	15 (%20,5)	12 (%16,4)	15 (%20,5)	12 (%16,4)	7 (%9,6)	4 (%5,5)	8 (%11)
12. I have taken measures to protect the living beings in my immediate vicinity.	3 (%4,1)	4 (%5,5)	12 (%16,4)	7 (%9,6)	12 (%16,4)	10 (%13,7)	25 (%34,2)

The responses to the Environmental Behaviour Scale items demonstrate that the most frequently occurring behaviour amongst the pupils is 'placing non-recyclable waste in garbage bins' (n=50; 68.5%) followed by 'placing recyclable waste such as paper, glass, and plastic in recycling bins' (n=44; 61.1%). More than half the pupils responded 'never' to the statement 'In line with the laws and regulations in effect, I have cooperated with the authorities against those causing harm to natural landmarks' (n=40; 55.6%) followed by the statement 'I have

volunteered for certain activities to protect the environment (e.g. signing up for membership for the Tema Foundation, taking part in school clubs about the environment)' (n=23; 31.5%). It is worth noting that almost a third of the pupils have never taken part in any voluntary activities. The defining statistics for the Environmental Behaviour Scale are presented in Table 7.

Table 7. *Defining Statistics for the Environmental Behaviour Scale*

	n	$\overline{X}$	Median	Mode	df	Min	Max
1. Amongst the people close to me, I have warned those who display behaviour that might be harmful to the environment.	70	4,43	5,00	6	1,673	0	6
2. I have bought foodstuff bearing the organic product logo.	71	3,49	4,00	6	2,144	0	6
3. I have planted trees, flowers, or other plants in order to protect the environment and its beauty.	72	3,83	4,00	6	1,914	0	6
4. I have bought products bearing the recycling logo (♻) on them.	73	3,32	3,00	6	2,121	0	6
5. I have volunteered for certain activities to protect the environment (e.g. signing up for membership for the Tema Foundation, taking part in school clubs about the environment).	73	2,05	2,00	0	1,892	0	6
6. Of the issues threatening our world such as nuclear pollution, acid rain, and sea pollution, I have done research on at least one.	72	3,15	3,00	3	1,962	0	6
7. In line with the laws and regulations in effect, I have cooperated with the authorities against those causing harm to natural landmarks.	72	1,43	0,00	0	1,992	0	6
8. I have placed non-recyclable waste in garbage bins.	73	5,21	6,00	6	1,384	0	6
9. I have placed recyclable waste such as paper, glass, and plastic in recycling bins.	72	5,13	6,00	6	1,404	0	6
10. I have developed practical, useful, and simple methods to keep the environment clean.	72	2,61	2,50	0[a]	2,053	0	6
11. I have put forward some suggestions to the authorities or my teacher concerning the protection of endangered species.	73	2,38	2,00	0[a]	1,919	0	6

12. I have taken measures to protect the living beings in my immediate vicinity.	73	4,07	4,00	6	1,858	0	6

The data from Table 7 suggests that placing non-recyclable waste in garbage bins (X =5.21; df=1.384) and placing recyclable waste in recycling bins (X = 5.13; df=1.404) are the most frequently occurring behaviours. Warning those causing harm to the environment (X= 4.43; df= 1.673) and taking measures to protect the living beings in the environment (X= 4.07; df=1.858) are also frequent behaviours. Amongst the least frequent behaviours is cooperating with the authorities against those causing harm to natural landmarks (X =1.43; df=1.992).

The minimum score that can be obtained on the Environmental Behaviour Scale is 0 and the maximum score is 90. As for the sub-dimensions of the scale, the minimum and maximum scores are 0 and 30 for the sub-dimensions of behaviour protecting the natural balance (items 6, 8, 9, 13, and 14) and social behaviour (items 1, 3, 10, 11, and 15). The minimum and maximum scores are 0 and 12 on the advanced cognitive behaviour sub-dimension (items 2 and 5). The average scores that the study group obtained on the items of the scale are as follows:

- Total average score on the Environmental Behaviour Scale: 39 (min=0; max=68; df=14.69)
- Average for the sub-dimension of behaviour protecting the natural balance: 11.08 (min=0; max=27; df=7.37)
- Average for the sub-dimension of social behaviour: 21.47 (min=0; max=30; df=7.20)
- Average for the sub-dimension of advanced cognitive behaviour: 6.45 (min=0; max=12; df=3.77)

The data on the Environmental Behaviour Scale, both as a whole and in its sub-dimensions, suggests that the pupils who took part in the study exhibit environmental behaviours with mid-level frequency.

The Kolmogorov-Smirnov normality test was conducted to check for a normal distribution of the total scores and the sub-dimension scores on the Environmental Behaviour Scale. The test results indicate a normal distribution of the data (p>.05) for the environmental behaviour total scores and the sub-dimensions" of behaviour protecting the natural balance and advanced cognitive behaviour but a non-normal distribution (p<.05) for the sub-dimension of social behaviour. Therefore, in this study, both parametric and non-parametric tests were used for data analysis.

The Mann-Whitney U test and the t-test were conducted to determine whether the pupils' Environmental Behaviour Scale total scores and sub-dimension scores had any relation to gender. The t-test results for the Environmental Behaviour Scale total and sub-dimension average scores in relation to gender are presented in Table 8.

Table 8. *T-test Results for the Pupils' Environmental Behaviour Scale Scores and the Gender Variable*

	Gender	N	$\overline{X}$	sd	t	df	p
Protecting Natural Balance Sub-dimension	Female	35	11,69	6,86	0,66	74	,051
	Male	41	10,56	7,83			

Advanced Cognitive Behaviour Sub-dimension	Female	35	7,14	3,70			
	Male	41	5,85	3,76	1,49	74	,138
Environmental Behaviour Scale Total Score	Female	35	42,97	12,49			
	Male	41	35,61	15,69	2,23	74	,028

The t-test results demonstrate a statistically significant difference (p<.05) between the male and female pupils, in favour of the girls, in the Environmental Behaviour Scale total score. No statistically significant difference was detected between the male and female pupils (p>.05) in terms of the protecting the natural balance and advanced cognitive behaviour sub-dimension scores. The Mann-Whitney U test was conducted for the social behaviour sub-dimension average scores, which showed a non-normal distribution. The sub-dimension average scores for the female and male pupils were found to be 24.14 (df=6.20) and 19.20 (df=7.28), respectively. The Mann-Whitney U test results suggest a statistically significant difference between the male and female pupils, in favour of the girls, on this sub-dimension (*rank average female*= 47.63; *rank average male*= 30.7; *U*=398; *z*=-3.34; p<.05).

The statistical analyses also demonstrated no statistically significant difference in the Environmental Behaviour Scale total scores and the sub-dimension scores in relation to parents' education levels.

3.4. Findings on the Cognitive Skills Interview Form

By means of the Cognitive Skills Interview Form, the study aimed to get the pupils to identify environmental issues, analyse these issues, and put forward suggestions for the solution of these issues. In this context, the pupils were asked three open-ended questions. The responses on the interview forms were independently coded by the researchers, the results were compared, and agreement was reached where discrepancies arose.

The pupils were asked to write down five environmental problems that they considered important. The data on the responses are presented in Table 9.

Table 9. *Environmental Problems That Pupils Consider Important*

Environmental problems	Frequency (f)	%	Environmental problems	Frequency (f)	%
Water pollution	61	80,26	Nuclear waste	4	5,26
Air pollution	56	73,68	Industrial waste	3	3,95
Soil pollution	29	38,16	Natural disasters	3	3,95
Environmental pollution	23	30,26	Depletion of natural resources	2	2,63
Global warming	18	23,68	Poaching / Illegal hunting	2	2,63
Littering the environment	16	21,05	Radiation waste	2	2,63

Noise pollution	12	15,79	Waste of water	2	2,63
Drought	11	14,47	Unplanned urbanisation	2	2,63
Wildfires / Deforestation	11	11,84	Light pollution	2	2,63
Extinct species	9	11,84	Unrenewable energy sources	2	2,63
Landslides	9	7,89	Unnecessary constructions	1	1,32
Felling of trees	6	7,89	Harmful gases	1	1,32
Insensitive generations	5	6,58	Natural gas	1	1,32
Disuse of recycling bins	4	6,58	Space pollution	1	1,32
Greenhouse effect	4	5,26	Famine	1	1,32

Water and air pollution were cited as important environmental problems by a large majority of the pupils. These were followed by soil pollution, global warming, and littering the environment. The pupils mentioned a variety of problems and their responses suggest an awareness of a great deal of environmental issues. On the Cognitive Skills Test, the pupils were asked which one of their five environmental problems they considered to be the most serious and the causes of that problem. The responses revealed air pollution (n=16, 21.62%) and water pollution (n=13, 17.57%) as the most important environmental issues followed by global warming (n=9, 12.16%).

The pupils mentioned

-Unfiltered factory chimneys / Harmful gases released by factories,
-Unnecessary use of deodorants and fragrances,
-Polluting gases from the exhaust pipes of cars,
-Felling of trees,
-Fossil fuels,
-Tobacco smoke

as the causes of air pollution, the most serious environmental issue for them.

The pupils were asked to make suggestions for solving the problem of air pollution, the most serious according to them. Their suggestions were:

-Factory chimneys should be fitted with filters,
-Car use should be reduced,
-Use of deodorants and fragrances should be reduced,
-Harmful gases should not be emitted,
-Public transport should be more commonly used,
-More trees should be planted,
-Trees should not be harmed,
-Penalties should be enforced,
-Renewable fuels should be used instead of fossil fuels,
-More and more recycling bins should be put up,
-People should gain awareness.

Some of the pupils mentioned water pollution as the most serious environmental problem, with the following as its causes:

-Insensitivity / Lack of education,
-Industrial waste waters,
-No measures taken by authorities,
-Littered waters,
-Oil-polluted waters,
-Pouring household oils down the sink,
-Nuclear waste in waters.

Their suggestions for solution were:

-Manhole covers should be fitted with filters,
-Awareness-raising work should be carried out (posters, presentations, training etc.)
-Industrial waters should be treated,
-Authorities should take necessary steps,
-More penalties should be enforced,
-Household oils should be put in oil collection containers,
-Recycling facilities should become more common,
-Litter should be placed in bins.

Global warming was also cited amongst the most serious environmental problems, with the following as its causes:

-Unplanned use of natural resources,
-Exhaust gases from cars,
-Use of deodorants and fragrances,
-Harmful gases from factory chimneys,
-Population increase.

The pupils were asked to make suggestions for solving the problem of global warming. Their suggestions were:

-People should gain awareness,
-People should be sensitized towards the environment,
-Renewable energy sources should be used,
-Air pollution should be reduced,
-Global warming should be fought globally,
-A system should be put in place where each family gets no more than one car unless absolutely necessary,
-Oils that result from the activity of microalgae should be used instead of fossil fuels,
-Use of deodorants should be reduced,
-Relevant projects should be initiated,
-Population increase should be controlled,
-Use of public transport should be increased,
-Factory chimneys should be fitted with filters,
-Use of natural energy sources should be increased,
-Recycling facilities should become more common,
-Green spaces should be protected.

Overall, the findings on the Cognitive Skills Interview Form suggest that the pupils are conscious of environmental issues, cognizant of the causes of these issues, and capable of making suggestions as to functional solutions to these issues.

3.5. Findings on Environmental Pollution Drawings

It was aimed in this study to reveal the pupils' perceptions of environmental pollution. To this end, they were asked to draw environmental pollution themed pictures. Samples of the pupils' drawings are presented in Figure 1.

Figure 1. Samples of 'Environmental Pollution' Themed Pictures by the Pupils

The findings from the analyses of the pupils' drawings intended to uncover their environmental pollution images are summarized in Table 10. The code lists and themes used in the picture analyses, together with the frequency of these codes, are presented in the table.

The data from the picture analyses suggests a prevalence of 'dark coloured natural landscapes (dark grey skies, brown lakes, etc.)' under the theme of environmental pollution in general (n= 52, 68.42%). Another frequent visual was found to be pictures of 'garbage left in open spaces' under the theme of soil pollution (n=42, 55.26%).

Table 10. *Findings from Analyses of Environmental Pollution Themed Drawings*

Theme	Code	Frequency (f)	%
Environmental Pollution in General	Pictures with 'hazardous waste' symbols	2	2.63
	Pictures of dry, felled trees with fallen leaves / Barren soil	26	34.21
	Pictures of people in a polluted environment / polluting the environment	14	18.42
	Unplanned urbanization / Concrete everywhere	6	7.89
	Dark coloured natural landscapes (dark grey skies, brown lakes, etc.)	52	68,42
Air Pollution	Exhaust gases released by cars / aircraft / motor vehicles	11	14.47
	Gases from factory and/or house chimneys (black, grey)	27	35,53
	People wearing face masks and/or with mouths covered / unhappy people	8	10.52
	Global warming	2	2.63
Water Pollution	Pictures of rivers, lakes, or sea with solid waste (refuse) in them	30	39.47
	Surface waters (streams, lakes, rivers) mixed with waste waters (coloured brown, grey, etc.)	25	32,89
	Dead fish and/or other animals on water surface	19	25
	Air bubbles on water surface (water coloured green, brown, or dark yellow)	11	14.47
Soil Pollution	Garbage left in open spaces	42	55,26
	Pictures of irregular solid refuse storage (hazardous waste storage) spaces (also with vectors such as flies and rats about)	3	3.94
	Pictures of solid refuse storage spaces with leaking water (water leakage coloured dark brown and pictured towards soil or water surfaces)	1	1.31

Noise Pollution	Visuals of heavy traffic / heavy machinery / sound of horn	2	2.63
	Listening and dancing to loud music / pictures of loudspeakers	2	2.63
Light Pollution	Too brightly illuminated surroundings	1	1.31
Environmental Consciousness	Protests / concerned messages / slogans	14	18.42
	Clean environment contrasted with dirty environment	18	23,68

Visuals of 'rivers, lakes, or sea with solid waste (refuse) in them' under the theme of water pollution were found in 30 drawings (39.47%) while visuals of 'gases from factory and/or house chimneys (black, grey)' under the theme of air pollution were found in 27 drawings (35.53%). Besides, visuals of 'dry, felled trees with fallen leaves / barren soil' under the theme of environmental pollution in general were found in 26 drawings (34.21%).

The least frequent visuals in environmental pollution drawings were 'pictures of irregular solid refuse storage (hazardous waste storage) spaces' (n=3, 3.94%) under the theme of soil pollution, 'listening and dancing to loud music / pictures of loudspeakers' (n=2; 2.63%) and 'heavy traffic / heavy machinery / sound of horn' (n=2; 2.63%) under the theme of noise pollution, and 'pictures with "hazardous waste" symbols' (n=2; 2.63%) under the theme of environmental pollution in general. The visual of light pollution was found in only one of the environmental pollution drawings (1.31%).

It could be argued that the pupils' drawings are mostly concerned with environmental pollution in general and water and air pollution in particular. The environmental pollution drawings include fewer visuals of light and soil pollution. The pupils' environmental pollution images are consistent with the findings from the Cognitive Skills Interview Form. When the pupils were asked to draw pictures on environmental pollution, they preferred to draw the most serious environmental problem for them. There were no visuals of space pollution amongst the pictures drawn.

4. Conclusion

The present study reveals pupils' environmental literacy levels and the relation between these environmental literacy levels and different variables. The Environmental Sensitivity Scale, Environmental Behaviour Scale, and Cognitive Skills Interview Form given to the pupils, together with their drawings, demonstrate that the pupils have, in general, an environmental awareness on behaviour and sensitivity scales.

The results of the Environmental Sensitivity Scale administered to find out the pupils' inclinations of sensitivity towards the environment suggest that the pupils are sensitive to the environment and environmental problems, willing to take responsibility, and display responsible environmental behaviour. The Environmental Sensitivity Scale results show that the female pupils have a higher responsibility rating than the male pupils. These findings are consistent with many studies in the literature (Alp, Ertepinar, Tekkaya, and Yılmaz, 2008; Değirmenci, 2013; Deniş and Genç, 2007; Fortmann and Kusel, 1990; Gezer, Çokadar, Köse,

and Bilen, 2006; Iozzi, 1989; Kaya, Akıllı, and Sezek, 2009; Öcal, 2013). This study has found no relation between the parents' education levels and the pupils' environmental sensitivity levels. Köse (2010), however, argues that the higher the parents' education levels are, the more positively the pupils' environmental perceptions and attitudes will be affected.

The data from the Environmental Behaviour Scale administered to find out the pupils' behaviour towards the environment suggests that the pupils avoid behaviours that might cause harm to the environment, warn those who behave in this way, and display necessary behaviours to prevent environmental pollution. The results show that the female pupils have a higher total environmental behaviour score than the male pupils. Alerby (2000) attempted to elicit pupils' thoughts about the environment through drawings and observed that girls displayed higher environmental behaviour than boys in order to have a cleaner environment.

This study has found no link between the parents' education levels and the pupils' environmental behaviours. However, some of the studies in the literature conclude that the higher the parents' education levels and income are, the more positively the pupils' environmental knowledge and perceptions will be affected (Uzun, 2007; Altın, 2001; Arcury and Christianson, 1993; Ekici, 2005).

The Cognitive Skills Interview Form shows that the pupils are aware of many environmental problems. The pupils made reference to various environmental problems and demonstrated high levels of awareness of these problems. The most serious environmental issues cited by the pupils were water and air pollution, followed by global warming. Sadık, Çakan, and Artut, (2011); Çobanoğlu, Er, Demirtaş, Özan, and Bayrak, (2006); Littledyke, (2008) hold that, in pupils' drawings, the most dominant issue is air pollution, illustrated through factory chimneys and exhaust gases, followed by water pollution, illustrated through piles of rubbish on water.

The pupils' awareness of the causes of the environmental problems in question and their capability of making functional suggestions to solve these problems are evidence of high levels of environmental literacy. These findings are really encouraging. The environmental pollution images in the environmental pollution themed drawings made by the pupils and intended to reveal their environmental pollution perceptions are consistent with the findings from the Cognitive Skills Interview Forms. Water and air pollution drawings are the most frequent, with space, light, and noise pollution drawings rather in the background.

Environmental literacy, environmental consciousness, and environmental awareness in pupils can be ensured through effective environmental education. In addition to the educational processes at schools, parents will be the role models for pupils with their attitudes and behaviours. It should be remembered that the family factor occupies a crucial place in environmental education.

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE PREDICTOR ROLES OF LIFE-SATISFACTION, AND INTRINSIC-EXTRINSIC MOTIVATION ON THE PSYCHOLOGICAL WELL-BEING OF PRE-SERVICE TEACHERS

Research article

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THE PREDICTOR ROLES OF LIFE-SATISFACTION, AND INTRINSIC-EXTRINSIC MOTIVATION ON THE PSYCHOLOGICAL WELL-BEING OF PRE-SERVICE TEACHERS

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Abstract

The aim of the present study was to examine whether intrinsic and extrinsic motivations, and life satisfaction levels of pre-service teachers are significant predictors of their psychological well-being. The sample of the study was consisted of 230 pre-service teachers. Data were collected via Motivation to Teach Scale, Psychological Well-Being Scale and Life Satisfaction Scale. Descriptive statistics, Pearsons's correlations, and multiple regression analysis were performed. The results indicated that the intrinsic and extrinsic motivations, and life satisfaction levels were moderate, and psychological well-being levels were high. Psychological well-beings of the subjects were correlated highly with life satisfaction, moderately with intrinsic motivation, and weakly with extrinsic motivation. Moreover, intrinsic motivation and life satisfaction were found to have a predictive effect on the psychological well-being of the pre-service teachers, but extrinsic motivation was not a predictor. The results revealed psychological well-being, motivation and life satisfaction are important variables supporting the success in teaching profession.

Keywords: Psychological well-being, intrinsic motivation, extrinsic motivation, life satisfaction, pre-service teachers

1. Introduction

The vastly studied positive concepts such as psychological well-being, motivation, and life satisfaction are considered as important concepts for teaching profession. Psychological well-being, which is the expression of humanistic values, is defined as existential challenges in life, such as maintaining meaningful goals, personal development, and establishing high-quality relationships with others (Keyes, Shmotkin & Ryff, 2002). Psychological well-being, which is mainly about the self-actualization potential of a person, consists of six psychological dimensions: (i) *self-acceptance* that is a person's positive evaluations of oneself and his/her previous experiences, (ii) *personal growth* that indicates a person's continual development, (iii) *purpose of life* that shows the meaningfulness and purposefulness of one's life, (iv) *positive relations with others* that reflect the warmth and trust in interpersonal relationships, (v) *environmental mastery* that includes a person's capacity to lead his/her life in line with own needs and intentions, and (vi) *autonomy* that refers to a person's sense of self-decision (Keyes, Shmotkin & Ryff, 2002; Ryff, 1989; Ryff, 2014). Having a sufficient level of sensitivity to the personalities and mental health levels of

the students they attend is important for teachers in achieving psycho-social development and satisfaction in performing their teaching profession (Yazıcı, 2009). In this respect, psychological well-being is an important concept to investigate in the scope of teaching profession.

Recently, the positive approaches have gained more importance in psychology, as both preventive and protective studies as well as studies on personal development have increased (Kaya, Çenesiz & Aynas, 2019). When the literature is examined, the concept of psychological well-being begins to draw attention with the investigation of positive concepts in the field of psychology after the 1950s. However, after the 1980s, with more importance given to the theories that emphasize self-actualization and the potential of the individual for a meaningful life, psychological well-being started to be the prominent subject of many studies (Telef, 2013). It is believed that the concept of psychological well-being has been widespread within the world of psychology until recently, and that the experts are considered to be the most fundamental reason for late recognition of the importance of psychological well-being in terms of evaluating human psychology.

The positive psychology that draws attention as a current that transcends the boundaries of modern psychology, which changes the way of looking at the concept of mental health (Kaya, Çenesiz & Aynas, 2019); by emphasizing the individual has a number of positive characteristics rather than a psychological disturbance (Halisdemir, 2013). Previous studies have focused more on symptoms of psychopathological criteria such as anxiety, depression, and fear, and positive emotional expressions such as happiness have been overlooked. As noted, many researchers have failed to adequately explain positive emotional expressions such as psychological well-being, as the experts considered the lack of psychological symptoms equivalent to mental health (Tanhan, 2007). At this point, Ryff (1989) suggested that multidimensional psychological well-being modeling based on theoretical explanations of personality and development theories on positive psychological health changed the classical view of mental health, by integrating the theories of Maslow, Allport, Rogers, and Jung which explained the concept of psychological well-being as self- actualization, maturity, full functionality, and individualization (Ryff, Magee, Kling & Wing, 1999). Özen (2010) has seen positive psychology as the combination of such theories. Diener and his colleagues (2009, 2010) defined additional criteria to Ryff's (1989) multidimensional psychological well-being conceptualization. These criteria (including 'being connected and related', 'having self-respect', 'optimism', 'feeling talented and capable' and so on) complement the dimensions and explain socio-psychological well-being.

The lack of studies on positive components in the field of psychology has led researchers to work on positive emotions and positive psychology has begun to take shape. With positive psychology becoming important, "goodness" has become one of the forefront issues (Timur, 2008). It is seen as a success to reveal the psychological power of the human nature (Yavuz, 2006) instead of focusing on the weakness of the individual and the positive psychology which treats mental health according to the positive criteria while solving the problem in the psychological problem solving and helping the individual to come from above the disorders. In today's increasingly complicated conditions, increasing the life satisfaction by using the potential of the individual as well as the mental health is an important factor that facilitates the adaptation of the individual. From this point of view, the significance of the concept of psychological well-being has been doubled. Studies showed that individuals with higher levels of psychological well-being established more sufficient relationships with their environment, behaved more independently, had higher control over their own lives and environments, led a purposeful and meaningful life, and were more open to personal improvement and development (Corsano et al., 2006; İkiz & Asıcı, 2017; Ryan & Deci,

2001; Ryff, 2014). Therefore, investigating the psychological well-being of pre-service teachers is important, considering their positions of being role-models in their profession. In the current study, because of the fact that last year university students were about to graduate, the sample consisted of 4th-year-students to examine the study variables.

The concept of motivation defined as the process of affecting and motivating the individual to move, comes from the Latin word "movere" (Güney, 2017). Pintrich and Schunk (2002) define motivation as a process in which the action is initiated and maintained for a direct goal. According to Koçel (2003), it is the process by which people act in line to their own desires and wishes to achieve a certain purpose. Also, Aydın (2016) defines motivation as the various internal and external factors that drive the organism to certain behaviors, determine the regularity and continuity of these behaviors, give direction and purpose to behaviors and the mechanisms that enable them to function. For explaining motivation, that is defined in many forms, from a multidimensional way, it can be said that the concept of motivation includes internal and external factors and their operating mechanisms which determine the level of violence and energy, which directs the human organism to these behaviors, gives a certain direction to the behaviors and sustains the behaviors (Akbaba, 2006).

When motivation is evaluated from a theoretical point, it can be seen that in psychology motivation, as a biological, cognitive and social concept, has been a basic and continuing theme for many years (Deci & Ryan, 2000). It is seen that the concept of motivation, which is emphasized as a process, is examined with different theoretical approaches and the starting point of these theories is the search for an answer to the question of what motivates people (Altınkurt, Yılmaz & Erol, 2014). According to the literature, it can be said that motivation theories follow a developmental line from behaviorism to cognitivism parallel to learning theories (Acat &Yenilmez, 2004). While content-need theories of motivation consider the intrinsic motivation of human beings and ask what motivates humans, there are controversial views that criticize this question as being insufficient to explain motivation. As a result, instead of asking what motivates a person, how a person is motivated was questioned and process theories of motivation has emerged (Altınkurt et al., 2014). According to process theories, many external factors are also effective on motivation (Ayık, Ataş-Akdemir & Seçer, 2015). While content-need theories emphasize the nature of human needs, what motivates people, and the factors that drive the individual to behavior in a particular direction (Koçel, 2003); process theories focused on how human behaviors can be actuated and directed, and how repetition of a particular behavior can be achieved (Taştan, 2005). In other words, while content-need theories are concerned with individual variables that motivate and guide the individual, process theories deal with how behavior is sustained, and try to explain which goals motivated people and how they are motivated (Erdem & Gözel, 2014).

Responses developed within the individual towards inner needs such as curiosity, interest, knowing, understanding, sufficiency and feeling of development are defined as intrinsic motivations (Akbaba, 2006). While intrinsic motivation is related to one's beliefs, values, and perceptions directly related to the teaching profession, extrinsic motivation is related to the existing conditions outside the person and is influenced by general judgments of the community about the profession (Atav & Altunoglu, 2013). While individual and environmental factors in daily life determine the nature of the behavior, the effective and controlled use of these intrinsic and external factors gains more importance in the education, defined as the desired behavior change and winning process, different from daily life (Akbaba, 2006). The intrinsic and extrinsic factors were found to be effective while selecting teaching as a profession (Martin & Steffgen, 2002), and research on motivation has focused on how individual and environmental factors, including the training process, will stimulate and encourage learners to learn and succeed (Chen, 2001).

Life satisfaction is another concept that gained importance with positive psychology. Life satisfaction, primarily proposed by Neugarten in 1961 (Dilmaç & Ekşi, 2008), focuses on improving a person's strengths instead of weaknesses and failures, and seen as an effective in preventing psychopathologies. It is defined as the positive perception of the person of his/her mental world and surroundings as a whole (Ehrhard, Saris &Veenhoven, 2000). It represents the cognitive direction of subjective well-being and is defined as the self-assessment of the person's life (Diener, 2000). Life satisfaction, defined as a positive assessment of the whole life in accordance with the criteria set by the individual (Diener et al., 1985), includes the satisfaction of the individual about the past and future life, the desire to change his/her life and the views of the relatives about his/her life (Diener & Lucas, 1999). The perception of an individual's life satisfaction consists of evaluations of their comparative characteristics with their perception of life conditions (Pavot & Diener, 1993). Life satisfaction, develops due to the interaction with the environment, does not relate to a specific situation but positively evaluating the whole life of the individual and getting satisfaction in the life in general (Diener et al., 1985; Özer & Karabulut, 2003). The life satisfaction associated with subjective well-being differs from person to person (Recepoğlu, 2013) and expresses the individual's acceptance as if it is all living in his/her own life and environment (Arygle, 1994).

Literature has shown different and controversial information about the predictors of life satisfaction: in some studies psychological variables are found to be more effective in explaining life satisfaction; and gender, race, and income level are found to be unimportant factors in life satisfaction and happiness (Myers & Diener, 1995).Considering that life satisfaction is a criterion that includes social, economic, cultural and individual factors (Gündoğar, Sallan-Gül, Uskun, Demirci & Keçeci, 2007), the individual presents important information about his/her quality of life. From this point of view, it is considered that positive experiences may increase life satisfaction and decrease negative experiences (Kabasakal & Uz-Baş, 2013). Studies have been revealed negative correlation of life satisfaction with emotional loneliness (Çeçen, 2008), anxiety, and depression (Gündoğar et al., 2007); whereas positive correlations with self-esteem (Yetim, 2003). It is considered that studying the determinants that predict life satisfaction, which is an important concept affecting the happiness of the individual, will provide important contributions to the field.

It has been emphasized that the concept of motivation, which has an important role in understanding the behavior (Lefrançois, 1995), is related to many environmental factors such as learning experiences, and personality traits (Barrett, Patock-Peckman, Hutchinson & Nagoshi, 2005). Research emphasizing that needs are individual and changing over time have indicated that it is important to define the many different dynamic variables and the relationship between them that create academic intrinsic motivation for students (Uyulgan & Akkuzu, 2014). Considering that motivation is an important influence on academic achievement and performance, it is important to carry out studies that investigate the motivation factors that are effective in the selection of the teaching profession with sociological, psychological, and economical dimensions. Studies have shown that positive features such as motivation, psychological well-being or life satisfaction are important factors in achieving success in the teaching profession. Having a critical role in individuals' education, pre-service teachers would establish positive and satisfactory relationships if they had higher levels of psychological well-being. Moreover, psychological well-being would help them to be efficient role models. In our knowledge, the effects of life satisfaction and intrinsic-extrinsic motivations on psychological well-being have not been studied previously in combination; therefore, studying these variables would contribute to the understanding of importance of the positive sources in education. Therefore, determining the psychological well-being levels of pre-service teachers and investigating its relation to factors such as

motivation and life satisfaction will provide important contributions to the literature. For this purpose, the following questions were asked:

1. Are there significant relationships between psychological well-being levels of pre-service teachers and their life satisfaction, intrinsic and extrinsic motivation levels?

2. Do intrinsic and extrinsic motivations and life satisfaction significantly predict psychological well-being in pre-service teachers?

2. Method

2.1. Research Model

Predictive correlational research model was used in the present study. This model is performed to explain the changes in the dependent variable based on the changes in one or more independent variables (Büyüköztürk, Kılıç-Çakmak, Akgün, Karadeniz, & Demirel, 2019).

2.2. Participants

The participants of the present study consisted of 237 pre-service teachers who were enrolled to their 4th year in a state university in the east region of Turkey during 2015-2016 education year. Prior to the main analyses, univariate and multivariate outliers were assessed. Of 237 participants, total 7 were eliminated: 2 for not completing the questionnaire, and 5 for being univariate outliers. Univariate outliers were determined based on z scores, cases excessing the standardized score of 3.29 ($p < .001$, two-tailed test) were eliminated (Tabachnick & Fidell, 2007). For the final analyses, the data of 230 participants were included.

The distribution of the participants for demographic variables were summarized in Table 1. For gender, 42.2% of the participants were female (N = 97) and 57.8% were male (N = 133). 76.1% of the pre-service teachers perceived themselves on middle-level for their economical status (N = 75), and majority of them were single (N = 225).

Table 1. *Demographic Characteristics of the Sample*

		N	%
Gender	Female	97	42.2
	Male	133	57.8
Economical status perception	Low	41	17.8
	Middle	75	76.1
	High	14	6.1
Marital status	Single	225	97.8
	Married	5	2.2
Department	CEIT	24	10.4
	History	22	9.6
	Turkish Literature	22	9.6
	Elementary Education	36	15.7
	Turkish Language	52	22.6
	Social Sciences	24	10.4
	Biology	9	3.9
	Elementary Science	28	12.2
	Secondary Mathematics	8	3.5
	Chemistry	5	2.2
Total		230	

CEIT: Computer Education and Instructional Technology

2.3. Data Collection Tools

2.3.1. Motivation to teach scale (MTS)

MTS was developed to examine the intrinsic and extrinsic motivation levels of teaching for teachers and pre-service teachers by Kauffman, Yılmaz-Soylu, and Duke (2011), and was adapted into Turkish by Ayık et al. (2015). The scale has two subscales and total number of 12 items on a 5-point-likert scale (1: "totally disagree" and 5: "totally agree"). Higher scores indicate higher motivation levels both for intrinsic motivation, extrinsic motivation, and total motivation levels. For the present study, Cronbach alfa internal consistency levels were found to be .76, .63, and .81 for intrinsic motivation, extrinsic motivation, and total, respectively.

2.3.2. Psychological well-being scale (PWS)

PWS was developed by Diener et al. (2009, 2010) to measure the psychological well-being, which is complementary to existing good incidence scales. Telef (2013) conducted the Turkish adaptation study. The exploratory factor analysis revealed 42% of the total variance was explained. The Cronbach alpha internal consistency coefficient obtained in the reliability study of the scale was calculated as .80. The items of the Psychological Well-Being Scale are answered on a 7-point-Likert scale (1: "absolutely disagree" and 7:"absolutely agree").The scores are expressed positively and the scores range from 8 to 56. The high score indicates that the person has many psychological resources and power. Cronbach alfa internal consistency coefficient was found as .86 in the present study.

2.3.3. Life satisfaction scale (LSS)

The Life Satisfaction Scale developed by Diener, Emmons, Larsen, and Griffin (1985) was adapted to Turkish by Köker (1991). The scale consists of 5 items and it is evaluated as on a

7-point-Likert scale (1: "Absolutely disagree" and 7: "Absolutely agree"). The higher the scores, the higher the life satisfaction of the person. Köker (1991) determined that the test retest consistency coefficient was .85, and the item-test correlations were .71 and .80 for three-week intervals. The Cronbach Alpha internal consistency coefficient (α) of the scale is .76. The score on the scale ranges from 5 to 35. The internal consistency coefficient (Cronbach α) for the present study was found to be .85.

2.4. Data Analysis

The analysis of the data was carried out through SPSS 15 statistical package program. Firstly, whether the data set had a normal distribution was evaluated by examining Skewness coefficients, and the data set showed normal distribution. The independence of errors and multicollinearity assumptions for multiple regression analysis were also checked before the analysis. Pearson Correlations were used for determining the relations between study variables, and multiple regression analysis was used to evaluate the predictive effects of variables on psychological well-being.

3. Results

Table 2 shows the arithmetic mean, standard deviation, and minimum-maximum values of the scores of the pre-service teachers participating in the survey and the scores they have taken from the MTS subscales, PWS and LSS.

Table 2. *Means, Standard Deviations, Minimum and Maximum Values for MTS Subscales, PWS, and LSS.*

Scales and sub-dimensions	Min-Max	$\bar{X}$	Std. Dev.	Skewness
İntrinsic Motivation	6-30	18.22	5.30	-0.464
Extrinsic Motivation	6-26	15.31	4.47	0.024
Psychological Well-being	15-56	40.66	9.18	-0.737
Life Satisfaction	5-35	19.27	7.22	-0.130

As seen in Table 2, the mean scores of life satisfaction (19.27 ± 7.22) and intrinsic (18.22 ± 5.30) and extrinsic motivation (15.31 ± 4.47) are moderate and the psychological well-being (40.66 ± 9.18) is high.

The Pearson Correlation Coefficient analysis results, which were used to determine the relationship between intrinsic motivation, extrinsic motivation, life satisfaction and psychological well-being scores of pre-service teachers, are given in Table 3.

Table 3. *Relationships between Psychological Well-being, Life Satisfaction, Intrinsic and Extrinsic Motivation*

	Psychological Well-being	Life Satisfaction	Intrinsic Motivation	Extrinsic Motivation
Psychological Well-being	1			
Life Satisfaction	.65*	1		
Intrinsic Motivation	.42*	.33*	1	
Extrinsic Motivation	.27*	.32*	.60*	1

*p <.01

As seen in Table 3, it was found that pre-service teachers had a statistically significant positive relationship between intrinsic and extrinsic motivations for teaching, life satisfaction and psychological well-being. When the psychological well-being variable was examined, it was found that there was high correlation with life satisfaction ($r = .65$, p <.01), moderate correlation with intrinsic motivation ($r = .42$, p <.01). There was a moderate correlation between life satisfaction and intrinsic motivation ($r = .33$, p <.01) and extrinsic motivation ($r = .32$, p <.01). Finally, a high level of correlation was found between intrinsic motivation and extrinsic motivation ($r = .60$, p <.01) (Field, 2009).

Multiple regression analysis was used to determine the extent to which the intrinsic motivation, extrinsic motivation, and life satisfaction variables predicted psychological well-being of pre-service teachers (Table 4). Prior to the analysis, independence of errors, VIF (variance influence factor), and tolerance values were checked. For independence of errors, Durbin-Watson coefficient should be between 1-3 and in the present analysis, it was found to be 1.057. VIF values should be smaller than 4 and tolerance values should be larger than .20 (Field, 2009). The values indicated that the data met regression assumptions.

Tablo 4. *Multiple Regression Analysis for Predictive Role of Life satisfaction, İntrinsic and Extrinsic Motivations on Psychological well-being*

Predictor	*B*	*SE*	*β*	*t*	*tolerance*	*VIF*
(Constant)	20.41	1.865		10.945		
Life satisfaction	.744	.066	.585	11.251*	.87	1.115
İntrinsic motivation	.477	.106	.275	4.484*	.62	1.606
Extrinsic motivation	-.182	.126	-.088	-1.445	.63	1.597

Observed variable: Psychological well-being, *p <.001

Findings from the multiple regression analysis revealed that the linear combination of life satisfaction, intrinsic motivation, and extrinsic motivation predicts psychological well-being at a significant level (*AdjustedR^2* = .46, *F* (3, 226) = 66.887, *p*<.001). The variables of life satisfaction (*β* = .59, *t* (229) = 11.25, *p*<.001) and intrinsic motivation (*β* = .28, *t* (229) = 4.48, *p*<.001) in the regression equation were predictive of psychological well-being, where as extrinsic motivation was not found to be significant in this equation. According to this, it can be said that as the life satisfaction and intrinsic motivations of the pre-service teachers increase, the psychological well-being levels also increase.

4. Discussion, Conclusion and Recommendations

The present study aimed to investigate whether life satisfaction and intrinsic-extrinsic motivations predict psychological well-being of pre-service teachers. The results showed that the intrinsic and extrinsic motivations of the pre-service teachers participating in the research are moderate and that they have a generally positive profile in terms of teaching motivation. In the research that examined the relationship between the attitudes of teachers towards their professions and their motivations (Ayık & Ataş, 2014), it was found that perceptions of pre-service teachers about teaching motivation were higher than those of extrinsic motivation. In other studies, the levels of academic motivation (Alemdağ, Öncü & Yılmaz, 2013) and intrinsic motivation levels (Özdemir, 2013) were found to be moderate. There are numerous studies that found high levels of motivation for the teaching profession of the students (Altınkurt et al., 2014; Dereli-İman, 2014; Dereli &Acat, 2010; Erdem & Gözel, 2014; Gürdoğan, 2012; Ozan & Bektaş, 2011). According to Kaya, Yıldız and Yıldız (2013), the high motivation of teachers is explained by the fact that the teaching profession is far from material worries and more focused on high spiritual orientation. Dereli-İman (2014) stated that the teachers' adoption of the teaching profession and their love affects this result. Aktürk (2012) stated that the high level of academic motivation of pre-service teachers is directly related to their future professional performance. It is stated that the pre-service teachers' intrinsic motivations are related to their high level of competence and that they can do so by requesting their professional duties. It is emphasized that the fact that the pre-service teachers have high intrinsic motivation is that they will be successful in their profession at the same time, they will apply what they learn about the field and they will continue to learn lifelong. The positive externalities of the pre-service teachers are thought to be related to having profession and career and getting wages when they graduate (Dereli & Acat, 2010).

When life satisfaction is considered, it was seen that the satisfaction levels of pre-service teachers were moderate. Recepoğlu (2013) and Şahin, Zade and Direk (2009) found that the life satisfaction of the pre-service teachers was high and this positively affected their attitudes towards the teaching profession. In some studies (Gündoğar et al., 2007; Şar, Işıklar & Aydoğan, 2012), life satisfaction levels of pre-service teachers were found to be low. This result is attributed to the fact that the efforts related to the assignment have failed and the uncertainties in assignment have led to the decline of life satisfaction. It has been emphasized that uncertainty negatively affects mental health and this situation decreases life satisfaction (Şar et al., 2012). In a study conducted in seventeen different countries (Diener, 2000), it was found that most university students paid more attention to life satisfaction and happiness than money. When evaluated in general terms, it can be said that pre-service teachers positively evaluate their lives, their satisfaction with life is good and they affect their happiness levels. When evaluated in terms of psychological well-being, it is seen that pre-service teachers have a positive profile about high level of psychological well being, goodness and psychological health. Having high levels of psychological well-being might indicate that they would have less anxiety and stress for their profession, they would be more effective at their profession, and they would believe their success in the profession; this in return would help them to develop a positive attitude for the profession (İkiz, Asıcı & Kaya, 2018). This result shows that the pre-service teachers are happy and read in the sections they believe to realize their potential. It can be said that positive satisfaction of life satisfaction and psychological well-being increases the happiness of the individual in relation to each other and they generally have positive feelings.

There was a high positive correlation between the intrinsic and extrinsic motivations of the pre-service teachers in the present study. Similar to this finding, in the study conducted by Ayık and Ataş (2014), positive and significant correlations were found between intrinsic and

extrinsic motivations of pre-service teachers. It is stressed that extrinsic and intrinsic motivation is not independent of each other (Moore, 2001), with emphasis on extrinsic motivation affecting intrinsic motivation and contributing to development. It is suggested that external reinforcement be used carefully for the continuation and development of the students' intrinsic motivation (Gürdoğan, 2012). In relation to this, it is stated that a prize taken on-site is caused not only by extrinsic motivation but also by intrinsic motivation (Özdemir, 2013). When external factors change, the individual integrates the effects of changing factors and integrates intrinsic and extrinsic motivation. Yıldırım (2007) emphasized the importance of external factors by emphasizing that some requirements must be met in order for an individual to be motivated intrinsically. A different finding was obtained in a study that investigated the intrinsic and extrinsic motivational levels of the pre-service teachers (Gençay & Gençay, 2007). It has been stated that the higher the extrinsic motivation of the pre-service teacher may be related to the external awards and the extrinsic motivation negatively affects the intrinsic motivation. A supporting interpretation was also made by James (2005). According to him, it is a motivational effect of the fact that perceiving external sources as a control mechanism with a linear relationship between success and motivation. According to self-determination theory of motivation, it is emphasized that positive feedbacks and events that allow for the need for satisfaction have an increasing effect on intrinsic motivation, a negative effect of tangible and external awards and a risk of reducing intrinsic motivation (Deci, Koestner & Ryan, 1999). On the level of extrinsic motivation, it is clear that having moderate extrinsic motivation is more positive than having high extrinsic motivation, and that the study by Lin and McKeachie (1999) shows that those with moderate extrinsic motivation and high intrinsic motivation have both low and high extrinsic motivation have been found to be more successful than those with motivation. According to studies which showed the importance of both motivations (Yazıcı, 2009), it is emphasized that the most fundamental difference between the intrinsic motivation that is in the control of the individual and the extrinsic motivation that is in the control environment is related to the causality of the behavior, and that these two sources of motivation are important for the teaching profession.

There was a moderate relationship between the psychological well-being of the pre-service teachers and their levels of intrinsic motivation and a low level of relationship between psychological well-being and extrinsic motivations. To our knowledge, although there were no studies in the literature investigating psychological well-being and intrinsic-extrinsic teaching motivation, related variables were examined. Özcan and Karaca (2018) found that there was a positive relationship between academic motivation and psychological well-being. As a result, academic motivation was considered as an important factor influencing psychological well-being, therefore, studies for increasing academic motivation were thought to be crucial. Another study indicated that psychological well-being and achievement motivation is positively correlated, and individuals with achievement motivation are more interested in future plans and innovation (Nisa, Qasim & Sehar, 2017). Subjective well-being is another variable discussed with intrinsic and extrinsic motivation. Although subjective well-being and psychological well-being cover different aspects of positive psychological health, they are highly related (Keyes, Shmotkin & Ryff, 2002). A similar result was obtained from the study by Eryılmaz (2010a). Accordingly, subjective well-being has been found to be positively associated with intrinsic and extrinsic motivation. According to some studies that partially support this finding (Deci & Ryan, 1991; Sheldon & Bettencourt, 2002), subjective well-being has been found to be positively correlated with intrinsic motivation and negative motivation with extrinsic motivation. Attention has been drawn to the importance of motivating individuals both intrinsically and extrinsically to increase subjective well-being (Eryılmaz, 2010b). Research in education and psychology has shown that motivation has an

effect on affective variables (Marcou & Philippou, 2005). In order to understand motivation, it has been emphasized that self-determination theory that defies the necessity of taking psychological needs into consideration from individual and social point of view, motivation and performance of the prevention of needs to be reduced and adversely affecting psychological well-being (Deci & Ryan, 2000).

There was a high positive correlation between the psychological well-being of pre-service teachers and life satisfaction. It can be said that life satisfaction is highly correlated with psychological well-being, as obtained from studies done. Positive affection and perceived high level of life satisfaction indicate that subjective well-being is also high (Diener & Suh, 1997). Individuals who are satisfied with their lives are considered highly subjective well-being individuals (Lyubomirsky, Shelden & Schkade, 2005). It has been found that pre-service teachers' needs satisfaction affects their level of well-being (Cihangir-Çankaya, 2009). The high relationship between psychological well-being and life satisfaction is thought to be a sign of the goodness of the pre-service teachers to work as high-self, good-life and life-satisfaction individuals.

Pre-service teachers have been found to have a moderate positive relationship between life satisfaction and intrinsic and extrinsic motivation levels. It is stated that the students with high motivation level have high satisfaction and self-esteem about their lives (Gilman & Anderman, 2006) and they are satisfied with their interpersonal relationships. Factors that affect life satisfaction, such as the individual's career expectations, the point of view of the profession, and the values of the teaching profession (Akbaba, 2002), are important in selecting the teaching profession. It has been emphasized that low motivation leads to stress and anxiety (Yazıcı, 2009). Individuals should have a sense of personal control (Lu & Shih, 1997), in a sense the height of intrinsic motivation is an important source of life satisfaction.

In this study, intrinsic motivation and life satisfaction were found to have a predictive effect on the psychological well-being of the pre-service teachers, but extrinsic motivation was not a predictor. It can be said that the psychological well-being increases with the intrinsic motivations and life satisfaction of the pre-service teachers. According to findings from the present study, life satisfaction and intrinsic motivation were important predictors of psychological well-being, whereas extrinsic motivation was the result of psychological well-being in the procedure not being as strong a predictor as the other two independent variables. In the literature, to our knowledge, there is no direct study on the predictive effect of intrinsic and extrinsic motivation and life satisfaction on psychological well-being. Therefore, the findings of the present study is considered to be important for future studies. Many researchers consider subjective well-being and psychological well-being as a multidimensional phenomenon (Ryan & Deci, 2001), and in this context, it would be beneficial to consider two approaches together in order to examine positive psychological health in a multifaceted and whole (Cenkseven & Akbaş, 2007), it is thought that this finding obtained from our study can be evaluated based on the studies conducted on the subjective well-being variable. In one of these studies, Eryılmaz (2010b) found that intrinsic and extrinsic motivation were significantly and positively related to the use of subjective well-being enhancement strategies, and emphasized that it was important for adolescents to be motivated intrinsically and extrinsically to use subjective well-being enhancement strategies. The present finding that extrinsic motivation, that is highly related with external reinforcements, did not predict psychological well-being is in line with other studies. Özdemir (2013) found that external reinforcement was not found to be significant predictor of the intrinsic motivations of the pre-service teachers, and it has been argued that external rewards, such as financial rewards, are not effective in improving and strengthening intrinsic motivation. Since life satisfaction expresses the positive evaluation of the whole life and

satisfaction with life in accordance with the criteria determined by the individuals (Diener et al., 1985; Özer & Karabulut, 2003), higher levels of life satisfaction has a positive effect on the psychological well-being of self-actualization due to the fulfillment of life goals. The components related to life satisfaction such as life goals, feeling competent and capable, meaning of life, which are also dimensions of psychological well-being, explain the effects of life satisfaction and intrinsic motivation on psychological well-being.

All in all, it is important for the pre-service teachers to be positive about their life satisfaction and psychological well-being, which is closely related to their personality and mental health, and their motivation level, which is basically a psychological phenomenon, to feel themselves satisfied and fulfilled in their profession. Positive relationships between positive emotions such as motivation, life satisfaction and psychological well-being have been shown to be important factors in achieving success in the teaching profession. It is thought that these positive emotions are the effect of students determining the quality of their professional and social life besides university life. Hence, the university education given in this sense and the arrangement of the university environment to develop these characteristics will significantly increase the competencies of the pre-service teachers. Given the positive effects of motivation and life satisfaction on psychological well-being, it can be seen that it is very important to support the meaning and purpose of life, satisfactory relationships and life satisfaction teacher training, and to improve pre-service teachers' perceptions of themselves by increasing their competencies. It is important to support the strengths of pre-service teachers with the education given in the higher education in order to make them more active and functional and to train them to become individuals who can mobilize their positive resources. It is predicted that the findings obtained from this study will guide studies to be conducted with similar variables and the practices of psychological counseling and guidance units of universities. Moreover, the effects of intrinsic and extrinsic motivation on the psychological well-being of individuals in other developmental stages can be investigated. The fact that this research's subjects were chosen from a single university is an important limitation. For this reason, it is thought that future studies with larger sample groups and different class levels and using mixed methods will provide significant contributions to the literature.

5. Conflict of Interest

No potential conflict of interest was reported by the authors.

6. Ethics Committee Approval

Ethics committee approval was received from Van Yuzuncu Yil University (No: 85157263-604.01.02-E.34560).

Endnote

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USING ROLE PLAYING IN ORAL EXPRESSION SKILLS COURSE: VIEWS OF PROSPECTIVE EFL TEACHERS

Research Article

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Abstract

Conducting the lectures with effective approaches and methods is of prime importance for the acquisition of the necessary skills and competencies in the field of English language teaching. This study aims at determining the opinions of the pre-service teachers of English regarding the effects of the use of role playing technique in expression skills course, which is offered in the 2nd year at the Department of Foreign Languages Education, the problems experienced during the application process and the suggestions for the use of the technique. A semi-structured interview was implemented to gather the data. The data of the research were arranged and interpreted within the framework of the themes created for the purpose of the research with the descriptive analysis technique. The data obtained from the study results generally emphasize that role playing technique is an efficient method for students to improve their expression skills. Based on the results of the study, the application of the role-playing technique, may also be beneficial to the professional development of prospective teachers. Using drama in foreign language learning classes can improve the self-confidence of prospective teachers in terms of applying drama activities in their professional lives. However, when we consider this process as a whole, the difficulties students experience in this process should not be ignored. In order to minimize the problems participants made suggestions about the importance of space and equipment for the role-playing technique to reach its goal efficiently.

Keywords: English expression skills, role-playing technique

1. Introduction

Effective use of a language includes having a good command of reading, listening, speaking and writing as four basic language skills. Foreign language teaching programs are structured around the goals of helping students acquire these skills. Considering the involvement of language user, Widdowson (1978) distinguishes these skills as receptive and productive. While reading and listening belong to receptive skills, speaking and writing are classified as productive skills. Effective foreign language learning requires all four skills to be acquired, so learning foreign languages seems to be both a complex and time-consuming process (Kuśnierek, 2015).

In Turkey, to ensure effective foreign language teaching, English as a foreign language (EFL) classes have been introduced to the curriculum as early as the second grade. However, it is seen that increasing the number of lessons only is not sufficient to increase the quality of foreign language teaching. Undoubtedly, English teachers play an important role for students to acquire English language skills, because the conduction of English lessons according to effective teaching and learning approaches and methods depends primarily on teachers' having good command of language skills, content knowledge and pedagogical knowledge. Supporting language teaching, especially through different methods and activities, positively affects learning outcomes. In this sense, having different methods and technical knowledge to increase

professional competencies in teacher education is within the scope of professional knowledge courses.

Teacher education curriculum, which consists of content knowledge, pedagogical knowledge and general culture courses, aims to provide prospective teachers with skills and competencies related to their fields. Conducting the lessons with effective approaches and methods is of prime importance for the acquisition of the necessary skills and competencies.

The syllabus of the expression skills course that prospective English language teachers take in the first semester of the second year includes skills of speaking in front of the community, preparation and presentation of a speech, preparing and making comprehensive research-based presentations, examination of successful presentations in terms of content, form and suitability of audiovisual elements, verbal and written communication skills to be used in business environments such as interview, social environments, phone calls, presentations, meeting management, writing resume and letter of application. It was thought that it would be beneficial to use interactive methods that require active participation of students in acquiring these skills.

1.1. Literature Review

Many studies carried out both in Turkey and abroad have a positive impact on the development of learning outcomes of teaching courses with different methods and techniques in foreign language teaching. One of these methods, the drama method, is regarded to be useful for achieving learning outcomes effectively.

Drama is defined as the process of activities aimed at extemporarily restructuring a concept, behavior, sentence, idea, experience or event with the help of old cognitive patterns by developing plays in a group work, using theater techniques such as improvisation and role playing. Drama includes different techniques such as role playing, simulation, sketch, parody and pantomime. Role playing is the dramatization of a thought, situation, problem or event by an entire group or by a few people selected on a stage. In the role-playing technique, students assume the roles of the people and objects in the scenario and act out (Elitok Kesici, 2015). The purpose of playing a role is to teach a concept or develop a skill or an ability (empathy, communication, etc.). If the student is afraid to speak in front of the group as himself, he can speak in another person's role more easily. Reviving the personality of others and thinking like someone else helps the student develop more positive behavior patterns (Gözütok, 2006).

Budden (2004) defines role playing as a speaking activity in which one either puts himself in someone else's shoes or enters an imaginary state as himself. Contemporary theories about second language acquisition support approaches advocating that drama activities improve speaking skills in foreign language learning and thus accelerate language learning in general. Research shows that using drama techniques such as playing a role in foreign language teaching is effective in gaining various language skills, creating a positive classroom atmosphere and reducing language anxiety. The results of the study conducted by Demircioğlu (2010) reveal the positive effect of drama activities on vocabulary learning. The results of the study conducted by Atas (2014) support that drama techniques reduce students' speaking anxiety in learning English. Pointing out that traditional foreign language lesson hours are limited in school programs, Schenker (2017) studied the effects of extracurricular drama activities on the language skills of students of different age groups.

Role playing is very important in teaching English because it gives students the opportunity to practice communicating in different social contexts and in different social roles. The benefits of using the role-playing technique in the classroom can be listed as follows (Dorathy and Mahalakshmi, 2011): i. Role playing helps students cope with real-life situations and commonly used expressions, and gets them to think, ii. Role playing helps students work

together in teams or groups where they communicate to understand each other, because role playing is not simple actions such as reading or duplicating information from a piece of paper, iii. Role playing can be adapted to the needs of students in certain situations they can use certain words to achieve a specific learning outcome; iv. Role playing gives students more responsibility in learning and stimulates interaction; vi. Role playing offers students the chance to learn, assess their progress and learn English.

It is believed that playing role improves speaking fluency of students. In role plays, language functions, such as apologizing, greeting etc. are used more compared to other traditional language activities. The focus of the students should be drawn to the transmission of meaning rather than the proper use of language. Therefore, teachers can improve students' speaking skills in any social situation through role play. It means that students are provided with conditions that require more speaking than that is required by their curriculum (Porter-Ladousse, 1987 cited in Kowalska, 1991). Through role playing, students have the opportunity to develop the language required in social contexts.

Smith (1984), who believes that theatrical acting training show parallelism with foreign language learning, emphasizes that players and students share the same goal and face the same obstacles when dealing with new roles and new language in delivering the desired message. Smith argues that applying techniques used in theatrical art to language learning will be beneficial for language students in linguistic and social-linguistic terms. Role playing technique is reported to improve the problem solving and communication skills, and to support the development of students and their self-confidence. Çelen and Akar-Vural (2009) emphasize that language skills teaching programs, including theatrical art, allow students to create an imaginary world. This, according to Savignon (1983), gives students the opportunity for real use of the foreign language by discovering situations that they will never encounter in class settings.

In a study conducted by Akpınar Dellal and Kara (2010), the levels of awareness of foreign language prospective teachers and teachers about drama techniques were examined. According to the data obtained, although the level of awareness, knowledge and skills of prospective teachers and teachers about drama techniques is generally good, 90% of the teachers who participated in the questionnaire find themselves and education they received in drama techniques insufficient.

In the study conducted by Dunn and Stinson (2011), the effect of language teachers' having theatrical experience on their classroom applications of drama activities in language teaching programs was examined. The results of the research revealed that the artistic / theatrical experience levels of teachers who use drama techniques in language teaching lessons have an effect on the success of second language learners.

It can be said that experiencing different methods and techniques in courses will be effective in helping the pre-service English teachers to acquire language abilities, as well as skills of using different methods and techniques in their prospective lessons. Within the scope of the research, role playing technique was used in the expression skills lesson. It is thought that getting the opinions of prospective teachers about the use of role-playing technique will provide information about the effectiveness, strengths and weaknesses of the technique.

1.2. Research Questions

The aim of this study is to determine the opinions of the pre-service teachers of English regarding the effects of the use of role playing technique in expression skills course, which is offered in the 2nd grade at the Department of Foreign Languages Education, the problems

experienced during the application process and the suggestions for the use of the technique. For this main purpose, answers to the following questions were sought:

1. What are the opinions of English prospective teachers regarding how role-playing technique affects their expression skills in the Expression Skills course?
2. What are the opinions of the English language prospective teachers regarding the problems / difficulties they faced during the application of the role-playing technique in the Expression Skills course?
3. What are the suggestions of the prospective English teachers regarding the use of role-playing technique in the lecture skills course?

2. Method

2.1. Design

This study, which attempts to determine the opinions of prospective English teachers regarding the use of role-playing technique in the expression skills course, is a case study, which is one of the qualitative research methods. Case study in qualitative research is related to intensive study of an event (Glesne, 2012; Punch, 2005). Factors related to a situation (environment, individuals, events, processes, etc.) are investigated with a holistic approach and the focus is on how they affect the situation and how they are affected (Yıldırım & Şimşek, 2013). One of the main components of the term education is the process. Educational research contains information about the process and how the research group was affected in the process. Case studies are used when research questions are related to the process and allow to analyze the process in a context-dependent manner (Ozan Leymun, Odabaşı and Kabakçı Yurdakul, 2017). This study aimed to find out the effects of drama activities on English language skills of 16 students who took the expression skills course and to reveal the current situation based on the views of the students.

2.2. Participants

The study group was determined according to the typical case sampling, which is one of the purposeful sampling methods that allows in-depth analysis of situations that are considered to have rich information. The study group consisted of 16 students (6 males, 10 females) who took the course in the 2nd grade at the Department of Foreign Language Education. The students in the study group were coded as S1 - S16 according to the number of participants.

2.3. Data Collection

The data of the study was collected via questions prepared reviewing the literature and examining the studies on the subject. The questions aimed to reveal the opinions of students about the effects of the role-playing technique on the expression skills in English expression skills course, the challenges they faced during the application of the role-playing technique, and their suggestions regarding the use of this technique. The questions were reviewed and corrected based on expert opinions. The questions asked to the participants in the semi-structured interviews are as follows: 1. What are your opinions about how the role-playing technique applied in the expression skills course affects your expression skills? 2. What kind of problems did you experience during the application of the role-playing technique? 3. What are your suggestions regarding the use of role-playing technique in the expression skills course? Semi-structured interviews were made with the prospective teachers, and the interviews were recorded with a voice recorder.

2.4. Data Analysis

The data of the research were arranged and interpreted within the framework of the themes created for the purpose of the research with the descriptive analysis technique. In this approach,

one summarizes and interprets their findings through the lens of pre-determined themes. In this analysis, direct quotations are often included to reflect the views of individuals interviewed or observed (Yıldırım & Şimşek, 2005). In this context, the main themes of the research have been created to be in compliance with the research questions. The first main theme of the research is how role playing technique affects the expression skills, the second main theme is problems / challenges encountered in the implementation of role-playing technique, and the third main theme is the suggestions for the application of role-playing technique in the expression skills course. When the views related to each theme are examined, the views emerged were descriptively reported as sub-themes and supported with direct quotations. Voice recordings were transcribed based on student views. By reading the written data with a holistic approach, sub-themes that are intensively emphasized for each theme are identified. Students' views on sub-themes were interpreted by giving direct quotations under the main theme titles.

2.5. Validity & Reliability

In qualitative research, "validity" refers to the accuracy of scientific findings and "reliability" refers to the repeatability of scientific findings (Yıldırım & Şimşek, 2005). The data collection tool used in the research was arranged as a semi-structured interview form. The interview questions were prepared based on the literature review in a way to reflect the characteristics of a case study, and shaped by presenting them to the expert opinions. As the study is a case study, the researcher strengthened the credibility of the research through long interactions with participants and depth-focused data collection. In the research, transferability was increased in the research through detailed explanations and direct quotations. Also, in determining the sub-themes, two experts read the data with an aim to determine reliability by making comparisons.

3. Findings

In this section, the opinions of prospective teachers regarding the use of role playing technique in the expression skills course, *effects of role playing technique on expression skills*, *the challenges they faced in the implementation of role playing technique* and *suggestions about the implementation of role playing technique* are descriptively explained in themes.

3.1. Findings about How Role-Playing Technique Affects Expression Skills in Expression Skills Course

When the questions aimed at revealing the effect of role playing technique on expression skills are examined, it is seen that interviewees expressed the following themes: *adjusting tone, controlling excitement, overcoming fear of speaking in public, effective transmission of message, preparing a presentation, pronunciation and diction, body language (eye contact, posture), self-confidence and courage, fun, social interaction cooperation, other language skills (writing) and vocabulary, vocational preparation (gaining the ability to apply the technique), positive classroom atmosphere (fun), assuming different roles and awareness.*

3.1.1. Adjusting the tone of voice

Participants emphasized the effect of role-playing technique applied in the lecture on *adjusting the tone of voice*. S1 states that "*I had never made a presentation before the community, we learned and practiced better with the techniques and strategies we applied across the classroom, how to adjust our tone of voice, and how to convey a message across the community.*". This statement supports the proposition that this practice is effective in reaching the objectives of the course. S2 stated that:

As I said, it (expression skill) is a skill that requires speaking in front of the society. And you try to pay attention to such things as deciding whether to make eye contact, adjusting

the tone of voice; you try to speak with a proper diction. I definitely think that playing a role has a great contribution as these make up a big part of expression skills".

This expression suggests that drama allows students to improve their expression skills in the classroom. The opinion that this technique is absolutely compatible with the objectives of the lesson is expressed by S3 as follows:

For example, the objectives of our lesson are to be able to address to a specific audience or a certain community, to prepare and present a speech, to choose the messages appropriate for this audience and to use technology effectively. I think that we can develop these skills effectively with this technique and we can benefit from its effects and we properly realize and acquire them.

Comparing traditional presentations used to increase effective presentation skills in English with the role-playing technique, S11 stated that *"First of all, we felt more comfortable playing on the stage, for example, compared to normal presentations, we were more comfortable playing a role. This made a positive contribution to our ability to use tone of voice"*.

Whether in daily life or in professional life, everyone knows how important the tone of voice is in the transmission of a message. It can be said that it is possible to have an effective tone of voice thanks to breathing techniques. It is clearly seen from the expressions of the students that the role-playing technique is very effective in adjusting the tone of voice, which is regarded as one of the public speaking skills.

3.1.2. Controlling excitement

Under the public speaking theme, it is seen that the participants mostly emphasize *controlling excitement aspect.* S3 expresses the positive effects of the role-playing technique on her/him as follows:

I am a little excited when I get on the stage, but when I started to play my role, I realized that my excitement was decreasing. It is a positive situation for me to get less excited when I go on stage.

S6, on the other hand, explains what this technique they use in their expression skills course offers to them as follows: *"We also beat our excitement by conveying what we want to tell using body language, by adjusting the tone of voice, and by expressing ourselves in this way".* S7 states that *"That day, I had an individual presentation later in the class hour. Thanks to role-playing, I was able to control my excitement and body language at that time. And this has already been very positively reflected in my individual presentation."* In her statement, she says that this experience on stage was reflected positively on her performance in other lessons and she learned to control her excitement thanks to this technique.

3.1.3. Overcoming the fear of public speaking

Fear of public speaking is seen as a problem area for a significant number of students. S16 expresses a similar experience of overcoming their fears:

I was afraid of not being able to speak in front of the stage and the community I think role playing as a technique requires a lot of practice. Since it was a group work, the support of my friends was effective in overcoming this fear.

S10 explains that it was exciting for him to find himself on stage in front of the class, and later he overcame his excitement, fear and received positive feedback with this technique. S9, on the other hand, states that he is aware of the fact that he has stage fear, but at first he does not think that this technique will be effective in overcoming stage fear. *S9* explains that this idea changed in the following weeks by saying *"Frankly, I was afraid, because I had stage*

fright. When I started using this method, I realized myself, I got over my fear." This expression by this participant may be perceived as a proof that his fears disappear without any special effort as he adopts the role-playing technique. S1 expresses the negative effect of the technique by voicing the feeling that he experienced before the presentation with the role playing technique *"...before my presentation I was afraid that I would do something wrong ..."this is the worst negative feeling I have ever had..."* She tries to explain the reason for this by the fact that s/he had almost no stage experience before. If we interpret what S1 said about the effects of the technique with his own words, it can be perceived that this "*short drama activity*" has helped her overcome her excitement to speak in public and created a foundation for her future presentations.

3.1.4. Effective transmission of the given message

The participants expressed their views on the effect of role-playing technique on their ability to effectively deliver the given message. In their views about this dimension, which coincides exactly with the objectives of the narrative skills course, students believe that they have developed their ability to address to people, to express their thoughts to the public properly, and to appropriately convey a message to a certain community. S1 expressed his opinion as follows *"... we learned and practiced better how to convey a message before an audience. We learned how to give a message, how to adjust our voice, how to control our excitement.*" It can also be considered as evidence that the participants are aware that these qualities, which they emphasized when talking about the effects of role-playing technique, will be important for them in their professional lives. S4 expresses his experience with this statement: "*... you have never been in front of the community, and this opportunity for you can make you speak more confidently and more comfortably."* By saying "*… to be able to express oneself, to master and to explain it well",* S6 indicates his belief that the technique has a strong effect on foreign language expression skills. Believing that this technique used in the lecture lesson improves the ability to appeal to people and supports the larger communities, S12 supports the opinions of the participants who share their opinions on this issue. By evaluating this experience in the expression skills lesson as an opportunity offered to them, S10 points out the positive effect of the role-playing technique by saying:

> *If we were not in such an organization, perhaps we would be deprived of the chance and ability to express ourselves correctly and we would not be able to express our thoughts to society properly. Thanks to this drama technique, it was possible to express our thoughts and ourselves to the society correctly.*

It is emphasized by the participants that the way the message is conveyed is as important as the content of the presentation for any purpose.

3.1.5 Preparing a presentation

As can be seen from the participant's opinions, the stage experience was probably an activity for many of the teacher candidates that they encountered for the first time in their student life. Therefore, the participants pay particular attention to the pre-performance preparatory stage in order to be successful on the stage. Speaking of the effect of the role-playing technique on her narrative skills at the preparation phase of the presentation and in line with the objectives of the lesson, S3 states that *"it was a good experience to be able to produce content suitable for the level of my audience when I present. "* uses the expression. Emphasizing the importance of pre-presentation preparation in making the presentation effectively, S4 is of the opinion that a planned and disciplined preparation before the presentation provides self-confidence and comfort in speaking to the community: *"We used a new technique and when I apply something new about any subject, I am making a very good plan. So, I'm getting very well prepared on*

that topic." S8 stated that "they were very nervous at the beginning of the preparation phase, and that they were very happy when they realized that they succeeded when they started working after the consensus was reached on the content of the presentation. "*But when we later decided on the subject of the text and got together and started working, the rest came easily after the first sentence.*" S11 says that the preparation process before the presentation started with the creation of the whatsapp group, then they determined the subject by brainstorming and continued with the distribution of tasks. S11 pointing out that they paid attention to all details in the preparation phase such as appropriate role distribution, tools and equipment they will use, rehearsal days to meet indicated that they were successful on the stage at the end of such preparation process by saying: "*We all came prepared, communicated between friends, and when I got there, I was making a presentation for the first time, I was excited, but I think I did very well.*" As can be seen from the opinions of the prospective teachers participated the study, it can be understood that the preparation stage before the presentation coincides with the preparation of a teacher. The teacher preparing a lesson plan somewhat guarantees an efficient lesson presentation. It can be thought that this experience of prospective teachers in the practice of role-playing technique will be positively reflected on their professional lives.

3.1.6. Pronunciation and diction

S5, one of the participants who emphasized the importance of pronunciation and diction in communicating the message effectively while speaking in front of the community, stated after the application of role-playing technique that "*I realized that I had to improve myself on pronunciation*", which indicates the conclusion he reached as a result of his experience.S9 expresses that pronunciation and diction improvement as the strongest aspect of the role-play technique "*In terms of speaking, you become more fluent and more understandable. We can talk without getting stuck. I think it is effective on these issues*". Believing that pronunciation and diction are an important part of narration, S2 says that they take care to perform their roles with proper pronunciation and diction in order to make their speech fluent during the stage performance. Expressing his thoughts on pronunciation and diction during the rehearsals before they act out, S13 expresses his thoughts as follows: "*I can say that my speaking in the class improved as well. Maybe I will speak in front of a crowded community in the future, maybe I did a rehearsal for this.*" S16 supports the opinions of his friends, who expressed its positive effects on pronunciation and diction by saying that "*The role-playing technique we applied in the lesson helped us speak more fluently.*" It can be considered natural for foreign language teacher candidates to attach importance to diction, pronunciation and fluency in expression. Considering the challenges they face in learning foreign languages, it can be thought that role playing technique is a very effective method in this regard.

3.1.7. Body language (eye contact, posture)

Majority of the participants think that role-playing technique is a very effective tool in developing skills that are considered as striking during presentation, such as body language, eye contact, appropriate mimics, and stage stance. S7 stated:

Role-playing is an activity that requires us to actively use body language, we also paid attention to eye contact on the stage and paid attention to our tone of voice. So I think these have a positive effect on us. It was in line with our goals.

Stating that he has a general interest in stage plays and is willing to work with the first group in the first week of practice, S10 links his success on stage to body language, eye contact, gesture, mimic, and eye contact practices during rehearsals. S10 believes that these skills are important in expressing themselves effectively to the community "*I think I express myself well with my body language and tone of voice.*"S5 by stating that "*It shows us how important it is*

to use our tone of voice as teacher candidates…" emphasizes the strength of the role playing technique. It is known that being able to use body language, eye contact, voice tone effectively is as important as the content explained to the audience in classroom communication. The posture of the teacher and his ability to use the mimics properly, transforms him into an effective source of motivation during the learning process and saves the environment from being boring. It is understood from the participant's opinions that the role-playing technique is a good tool for foreign language teacher candidates to develop these skills.

3.1.8 Self-confidence and courage

Descriptive analysis of the findings also reveals the social cultural and psychological effects of role-playing technique on students. In this relationship, the opinions of the students were regarded as overcoming their shyness, gaining self-confidence and courage. S14 stated:

I am a very shy person, as I said I have never done anything like this before and this practice really helped me overcome shyness. It helped me to be a more confident person because being in front of that audience on stage is definitely not an easy thing to me.

Believing that the way to achieve academic success passes through self-confidence and courage, prospective teachers think that the main task of creating academic courage is up to teachers. Teachers apply different methods and techniques in order to give students confidence and courage in the classroom. In this regard, as one of the teacher candidates who argue that role playing technique is an effective tool, S8 states that *"It provides self-confidence in guiding students to do teamwork, enable them to combine their thoughts in a composition, to share roles and to achieve this in front of a community."*

3.1.9. Entertainment

Majority of the participant students also mentioned entertainment aspect even while expressing their opinions about different dimensions. They stated they had a lot of fun during the presentation on the stage and in the preparation stage. S13 stated they had fun in every stage of the experience by saying that *"We can say that we had a lot of fun during the creation of the script, it was a very enjoyable experience. Then we rehearsed and had fun in the same way during the rehearsals*." S10 also thinks that they have a pleasant experience as well as difficulties by saying that: "*It was a really nice and fun experience because we had a lot of fun, knitted up, we always found each other working in harmony with different people, not always with our closest friends."* It is known that game-based education has positive effects on achievements, improving learning skills and ensuring the long-term persistence of the knowledge gained. The pre-service teachers, who believed that learning with fun allows students to get motivated and learn faster, stated that the role-playing technique is effective in this sense. The statement of S15 expresses this belief *"In fact, it encouraged us to speak English first because it was fun and we learned daily expressions because role plays involve a lot of daily expression."*

3.1.10. Social interaction

It is known that as role play naturally involves teamwork, it is an activity that contributes to the social interaction of students. Thanks to this activity, pre-service teachers stated that they had the opportunity to meet the students, with whom they had never been friends in the classroom, and to expand their social relations. S8 states that *"By directing students to teamwork, enabling them to combine their thoughts in the form of a composition, to share roles, this technique instills team spirit and causes students to come together to share and brainstorm."* This enables prospective teachers to strengthen their social ties. The opinions of S2 support this idea:

Then when we said that we needed more people than our friends, they never turned it down, they did not break us they supported us. I also felt the kindness of this support, frankly, in a friendly environment. Therefore, as I said, I think it is an effective method not only on the stage, but also in terms of friendship relations.

Participants who describe the performance before and on the stage think that the role-playing contributes a lot to social interaction and making new friends.

3.1.11. Cooperation

Concepts such as social interaction, teamwork, group activities lead to collaboration, role sharing and task sharing. Participants believe that the role-playing instills them the spirit of collaboration. S3's sincere expression that "*I also adopted the group work very well, because I could never have created a script by myself. Although I have added something, we have achieved something thanks to the group"* proves the spirit of collaboration. One of the distinctive features of team spirit is to contribute not only to his/her own success but also to that of the other members of the team. Collaborating and brainstorming at the preparatory stage, determining topics, distributing roles equally, and rehearsing are activities that require collaboration. S12's statement that *"Going on the stage and acting out the scene was not an easy task. But I think that I was able to adapt comfortably as I do not have much difficulty in this aspect. And I tried to help other friends about this…*" indicates that S12 supported his teammates even on stage. Thanks to cooperation in group activities, students acquire new knowledge and skills from each other by mutual support. On this issue, S16 described his own experience as follows: *"Thanks to the rehearsals we did with my friends before the stage, my self-confidence increased on the stage. As it was a group work, the support of my friends also had an effect on overcoming this fear."* Conveying his thoughts in line with the opinions of his friends, S4 shared the positive effects of the technique in terms of collaborative learning by bringing together different talents. As understood from the expression of S14 that *"Then, we come together (we are always together in this process, we are in a group), according to the characteristics of the people we have distributed roles.... If we have, we also determined the costumes by helping"* successful implementation of the role-play technique requires social interaction and cooperation among the group members.

3.1.12. Other language skills (writing) and vocabulary

Findings also reveal the effect of role-playing technique on students' language skills. Participants argue that the technique has an impact on different language skills than individuals. While some of the participants emphasized speaking skills, S13 stated that "*I can also say that my speaking has improved in the classroom*", P16 marked that "*It helped us speak more fluently*." and S9 maintained that "*My speaking improved a bit more."* S14 explains the technique's effect on grammar, and S15 explains its effect on vocabulary. S15 states that *"We also learned more daily expressions because role-plays include a lot of such expression. Thus, the structures remained in our minds better and role-plays also improved our English in terms of vocabulary.*" From the statement of S16 that *"While writing scripts with my group friends, we wanted to create something creative and interesting",* we understand that while writing the script, prospective teachers had the opportunity to improve their English writing skills.

3.1.13. Professional preparation (gaining the ability to apply the technique)

The majority of the participants are of the opinion that the skills acquired through role playing technique will be very useful for them in teaching. It is stated by the participants that the skills required for the efficient presentation of the information that a teacher will convey to the student in the classroom environment are in line with the achievements of the expression

skills lesson in the program. It is emphasized that the technique is an effective tool in terms of professional preparation.

By stating that *"...because teaching is a stage art and drama and theater are also the most important part of the stage."* S6 compares teaching to stage art and teacher to an actor on stage, and points out that both should acquire similar techniques and skills in terms of professional preparation. Findings show that the vast majority of the participants think that the application of role-playing technique is very effective in prospective teachers' acquisition of these skills. S1 states that *".....and since we will be teachers in the future, we need to use our tone of voice and body language effectively. Thanks to role-playing, we can overcome them and improve ourselves."* S5 points out that "… *It shows us how important it is to use our tone of voice as teacher candidates."* With the following statement of S10 *"We are currently studying teaching and I think that when we become teachers, we will express ourselves well to students using this technique."* These indicate that the participants positively evaluated the effects of the technique professionally.

3.1.14. Positive classroom atmosphere (fun)

The fact that achieving positive and fun class environments facilitates language learning process is evidenced by field studies conducted by many foreign language experts. The statement of S12 that "*Pretty fun lesson*" is evidence of the positive reflection of the technique they tried in the classroom environment. S15 also states that they had fun on the stage during the presentation in the classroom, and also during the preparation phase as they compile the script. Comparing it to the traditional approach, S5argues that they have had a very fun lesson by including their teacher in the process by stating that *"As far as I can see, both my friends and our teacher had a lot of fun. Unlike other lessons, we were learning with fun, it seemed more attractive to us."* The role-playing technique is compatible with the student-centered learning approach, which is evidenced by the students' views that the teacher sides with the students and takes over the role of the supervisor by changing the teacher's authoritarian role.

3.1.15. Taking different roles

It is known that taking different roles is a very effective technique in the elimination of stressful obstacles such as "I cannot do", "I will be disgraced", which occurs to learners when speaking foreign languages. In this case, language learners adopt the identities as a result of their roles and during the conversation, they think that possible mistakes are made by their new identities, not by themselves. This causes them to overcome their speech anxiety and excitement. The findings reveal that the statements of the participants are also in this direction. S2 state his/her feelings as follows: *"I felt more comfortable in this technique in front of the class compared to presentations. Because you take on another identity and you feel as if someone else is in this environment for you, not for you.*" S6 thinks that *"Putting yourself in a different role, putting yourself in a different role other than yourself..."* requires self-confidence. A self-confident teacher is one of the factors underlying success in the learning process. It is understood that the ability to play different roles required by the role-playing technique has a positive effect on the teaching and learning process, either directly or indirectly.

3.1.16. Awareness

Participants highlight the awareness raising feature of this activity while explaining the effects of role playing. S8 stated that "*Being able to do something that I haven't tried before and the feeling that I could do it also gave me happiness and awareness*." S13 stated that *"I turned 3 balls at the same time. Actually, I didn't think I would be able to show my ability in front of the class. I achieved this and realized my own talent as well.*" S14 stated that"…*I think it reveals different talents. What talents people have is revealed when using this technique. I*

realized that I could use body language and I had the ability to act." These statements verify awareness raising effect of role playing. Again, S2 thinks that one of the strengths of the technique is that it allows to understand that people tend to different things and that they are talented for different subjects. S2 expressed his feelings as follows: *"In fact, I felt a little more relaxed as I realized that this was not that difficult. I couldn't believe what I did, so I was even surprised how easily I took it."*. These statements show us that, evaluating themselves and their peers throughout the application of the role-playing technique, the students discovered different talents they and their peers have and gather around the opinion that they should not have prejudice in their professional life or in their relationships.

3.2. Findings Regarding the Problems / Challenges Encountered in the Implementation of Role-Playing Technique in the Expression Skills Course

Problems / challenges encountered in the implementation of the technique were determined to be "*the fear of failure, unwillingness, avoiding responsibility, lack of space and time, memorizing lines, crowded class, shyness, role distribution, finding a topic and writing a script.*"

3.2.1. The fear of failure

While the participants evaluated the process from the beginning to the end, some of them stated that they had fear of failure at the beginning of the role-play activities. S1 stated that "*I was worried about doing anything wrong. This is the worst feeling I had before I made my presentation.*" S2 stated that "*When you asked, I had a bias that I absolutely would not be able to do that. Not only me, but also my friends, thought that we cannot do such a work on the stage, I cannot do it absolutely.*" S9 stated that "*Obviously I was afraid because I had stage fright...*" S10 stated that "*First of all, I was a little frightened, I thought about how I could do, what I could do, I even kept asking myself if I should get involved.*" All these expressions indicate that the students have a fear of being unsuccessful because they have no stage experience before. It is known that the fear of failure is a very effective factor in people's life, for example, it is known to be a serious obstacle to action and achieving a goal. One of the biggest negative effects of fear of being unsuccessful on people is that it leads to reluctance. This is expressed as a problem in group work. Findings from the opinions of the participants also confirm these beliefs.

3.2.2. Unwillingness

The participants expressed the lack of willingness of some of their classmates as a problem / difficulty in the process. S3, one of the participants who expressed his opinion unwillingness, stated that he saw this situation as a problem and said that *"some students may feel that they will be embarrassed.*" and he actually links it with the fear of failure. S8 stated that "*...not everyone in the group is eager or motivated enough...*" S9 stated that "*I think it will be more efficient when the student voluntarily participates.*" S10 stated "*I would like students to be more volunteered.*" With these statements indicating their opinions on this matter, they evaluate the reluctance of some of his friends in the activity as a problem they experienced during the application of his technique.

3.2.3. Avoiding responsibility

As in all group activities, prospective teachers emphasize that group members are to take responsibility for the success of this activity. Group members who had problems in this regard during the event express this situation as their difficulty. When evaluating the process, S3 states that one of the drawbacks of the group work is that some group members are left behind, "*...or people who fail to take responsibility pretend to have worked without being involved in group*

work. According to S3, "*It can be difficult in the process to keep evasion of responsibility under control*".

3.2.4. Lack of space and time

Finding a suitable place for rehearsals and allocating sufficient time for rehearsals is also included in the problems / difficulties experienced during the implementation of the role-playing technique. Two of the preservice teachers, S6 and S10, stated that they had difficulty in getting together *because of space and time shortage*. S6 states this situation "*There was a little shortage of place and time. Meeting and working together was a bit difficult*". S10 stated that "*… We could not come together to rehearse; … I wish we could work harder and presented something better…*" It is understood from the statement that they have a time and place shortage.

3.2.5. Memorizing lines

While the participants talked about the problems in the process, they also mentioned the difficulty they experienced in memorizing lines. Only two of the teacher candidates, S7 and S10, stated that they had problems memorizing their lines. S7 explains that he forgot his lines due to excitement, "*At times, I forgot my lines when I was excited.*" S10 says this is due to time constraints and states that "*Of course, from time to time we had difficulties, we couldn't memorize some parts, we couldn't rehearse…*"

3.2.6. Crowded class

S10 as a teacher candidate who tells that crowded calls is a disadvantage in the implementation of such a technique states that "*Classes are generally crowded and it is quite natural to get excited, we might forget what we will say and our motivation can decrease due to the fear of being disgraced.*"

3.2.7. Shyness

According to the participants, shyness is also one of the challenges encountered in the application of the technique. At the beginning of the process some of the teacher candidate explained that they suffered from shyness and it is due to different reasons. S9 stated that "*As I said before, I did not think this method would be effective. Obviously I was afraid because I had stage fright.*" S1 stated that "*I was worried about doing anything wrong. The reason for this was that I had no chance to experience presentation before.*" S2 stated that "*... I was biased that I absolutely cannot do.*" S8 stated that "*It was something that me and my group friends didn't do before and were worried about 'if we can we do it' or 'where we should start…*" and S3 said "*We were very excited when we started, none of us had that much idea, we were bewildered at first even if we had a little experience...*" As it can be seen from these statements, the participants generally experienced shyness at the beginning of the application process because they did not have enough experience in this regard.

3.2.8. Role distribution

One of the problems usually encountered in collaborative group work is the distribution of tasks. Some students felt as if they are doing most of the work, so some feel excluded. The participants express this issue in the application of the role-playing technique. Teacher candidates who stated that inequality may arise in groups if roles are not properly distributed and regard this situation as a problem faced in the process. S8 stated that "*Failure to share roles correctly and not being eager or motivated enough for everyone in the group can be a weak side.*" and S10 marked that "*…We had a hard time trying to act out the drama, there were inequalities in the role distribution.*" These comments indicate that difficulties may arise

in case of inequality in distribution of tasks in group work, and difficulties may arise in this process.

3.2.9. Finding a topic and writing a script

At the beginning of the process, most of the teacher candidates state that they had difficulty in *finding topics and creating texts* and after they had overcome this problem in the process, they entered into a fun process. S14 stated that "*We just had a hard time choosing the subject, whether it should just involve message or fun...*" S16 states, "*While writing scripts with my teammates, we wanted to create something creative and interesting. But this was not an easy process. We tried to find the best by brainstorming. This was a little difficult for us.*" S5 stated that "*We had no problems. We thought what to do about choosing a topic but we had a lot of fun when we watched ourselves in rehearsal and after doing it in the classroom.*" S7 stated "*... It may have been because we had no such experience before, or because we had our first experience, we had a hard time preparing the script*" and likewise, S13 stated "*We tried to find a topic first, maybe we might have some difficulty at that point...*" S15's statement that "*... but for example, finding a topic has been a bit of a problem*" indicates that they had difficulty in determining the topic of the play and writing the script.

3.3. Findings Related to the Suggestions for the Application of Role-Playing Technique in Expression Skills Lesson

Participants made the following suggestions for the application of role playing technique in the course: *this technique should be applied more frequently, sufficient time should be given for studies, individual assessment should be made, appropriate space and equipment should be provided, subject selection should be determined in advance and equal role sharing should be ensured, willingness should be ensured and English Drama Club should be formed.*

3.3.1. This technique should be applied more frequently

As it turns out from the findings, some of the participants found the application efficient and asked for its frequent use and continuation. For more frequent implementation of the role-play technique, S1 suggested that "*I think we can do more professional presentations, it should be used more often*" and similarly, S11 stated that" *I think we should continue using this technique*" and "*its content should consist of current issues to attract the attention of the audience.*"

3.3.2. Sufficient time should be given for studies

Some of the participants emphasized that enough time should be given to the groups for the application of the technique. S2, who emphasized the need for enough time to achieve more successful results in the application of role-playing technique, complained that they could not enjoy the opportunity by saying that "*That's why we felt it was over just when we got into this event.*" S5, who shares the same feelings, stated "*If we had more time, we could have better conveyed the message we wanted to give.*" As seen from the opinions and suggestions of the students, the role-playing technique, one of the collaborative group work, requires proper planning from the beginning.

3.3.3. Individual assessment should be made

One of the participants emphasizes individual evaluation as well as group evaluation. Even if role playing is a group work S3, who thinks that individual evaluation is necessary stated that "*I think behind-the-scenes shootings can be done to see who is working on how much, or to be able to control ourselves and make self-criticism.*" Teacher candidates think that such a task should be given by the teacher.

3.3.4. Appropriate space and equipment should be provided

Participants *emphasize the importance of space and equipment* for the implementation of such techniques as role play. The participants, who pointed out that the current classroom environment, fixed tables and chairs, and limited stage cause difficulties in the application of this technique, shared the belief that more efficient results can be achieved if appropriate space and necessary equipment are provided. S10 stated that *"A more theatrical environment can be created"*. Similarly, S5 said that "*There could be a better equipped class*", and on the same issue, S6 suggested "… *I recommend it to be implemented in a wide area…*"

3.3.5. Subject selection should be determined in advance and equal role sharing should be ensured

Teacher candidates, who made suggestions about topic selection and role sharing, argue that they should make more proper use of this opportunity. S4 stated *"The ones with low narrative skills should not take the easy way out or the ones with higher skills choose the hard roles directly."*. They maintained that role sharing should be done more equally. When determining the subject, S11 stated that "*Topics on the agenda should be selected*", which can be considered as a correct strategy to attract people's attention.

3.3.6. Willingness should be ensured

Participants recommended that this technique should be on a voluntary basis and students will be more productive when they voluntarily participate in this activity. P10 stated that "*Students can be asked what they want to play and what roles they want to play.*" S16, who argues that the principle of volunteering should be taken into account in *task sharing*, stated that "*For example, one group is responsible for script, while other friends may be responsible for the performance of the game on stage.*" and similarly S9 also says "*I think it will be more efficient when the student voluntarily participates.*" He shared the view that the distribution of role sharing in line with the abilities of the students would be effective in reaching more effective results for the purposes of the narrative skills course.

3.3.7. English Drama Club should be formed

Offering continuation of this practice, S7 suggested that "*Under the name of the English Club, we can show something together with other grades and we make a name for our English club and we can show our awareness.*"

4. Discussion and Conclusions

In this section, the suggestions of the English language teacher candidates regarding the use of role-playing technique in the expression skills course are examined and the results are discussed and suggestions are made.

When the opinions of students about the use of role playing technique in expression skills lesson are examined, *it was seen that the effects of role playing technique on expression skills can be categorized under the themes of challenges they encounter in the application of role playing technique and suggestions for the use of role playing technique*.

When the views of the participants on how role-playing technique affects their expression skills in the expression skills course are examined, preservice teachers state that these effects are mostly positive and they are hardly exposed to negative effects. In addition, the participants emphasize that achievements of the technique match up with the learning outcomes of the expression skills course. Preservice teachers express these learning outcomes as *adjusting tone, controlling excitement, overcoming fear of speaking in front of the community, effective transmission of the given message, preparing presentations, pronunciation and diction, body*

language (eye contact, posture), self-confidence and courage, fun, social interaction, cooperation, competency in other language skills (writing) and vocabulary, professional preparation (gaining the ability to apply the technique), positive classroom atmosphere (fun), taking different roles and raising awareness . It is known to everyone that controlling excitement is one of the most important factors affecting public speaking. The fact that drama, which is a term of Greek origin meaning 'doing', 'acting', provides a friendly and stress free atmosphere for optimal learning (Miccoli, 2003; Gojian, 2010), and also acts as the main factor in language learning, improves body language, increases motivation and constantly involves students in the learning process. Gorjian, Moosavinia, & Jabripour's (2010) argument that drama is an effective tool for controlling excitement is supported by the results of the study conducted by Atas (2014). This study was conducted with high school senior students, and it was concluded that the drama lowered students' English-speaking anxiety and they started to speak without the fear of making mistakes. Most of the participants who expressed their views on the positive effects of the role playing technique, which is considered one of the techniques of drama, in the expression skills lesson, also mentioned the effects of this technique on their social skills, and its contribution to the improvement of their *friendships and collaborative* working skills. According to Millis (2001), who argues that cooperative learning is not a trend that will pass quickly, this method of learning and teaching provides students with social support to fulfill the complex tasks that cannot be achieved alone by satisfying the feelings of attachment and cooperation, which a human being desires. Moreover, students learn to share responsibilities and such a model of interaction helps make the classroom a cuter place (Harmer, 2001). In addition, collaboration provides students with the social and communicative skills necessary in their professional life. Participants expressed that having different roles is beneficial for the improvement of their writing skills besides creating fun atmosphere in the class and contributing to their speaking skills. Similar studies have revealed that the role-playing technique offers numerous possibilities for foreign language learners (Lee & Smagorinsky, 2000; Gassand Mackey, 2006). The results of studies on the use of role-playing technique in foreign language learning (Chotirat & Sinwongsuwat, 2011; Seif, 2017) have also revealed that the role-playing technique, which also involves written scenario, has positive effects on students' linguistic achievements. The results of the study (Kuśnierek, 2015), which shows that taking different roles and speaking like others creates an entertaining atmosphere in the classroom environment and this environment also lowers down the excitement levels of students to speak in a foreign language, and thus improves the speaking skills of the students (Kuśnierek, 2015). Participants' opinions regarding the experience of a fun teaching and learning process during the implementation of the technique coincide with the study findings of Kumaran (2017). Kumaran, who advocates that students who take part in role play activities using foreign language enjoy their experience, believes that students' communication in a foreign language on real-life topics with their friends without hesitation and fear reinforces their foreign language acquisition.

The data obtained from the study results generally emphasize that role playing technique is an efficient method for students to improve their expression skills. However, when we consider this process as a whole, the difficulties students experience in this process should not be ignored.

Participants' problems / challenges encountered in the implementation of the technique were determined to be *the fear of failure, unwillingness, avoiding responsibility, lack of space and time, memorizing lines, crowded class, shyness, role distribution, finding a topic and writing a script*. In addition to the fact that group works have many benefits in terms of cognitive, psychological, social and emotional development, such as improving the sense of solidarity among the students, increasing the academic success of the students, ensuring the social

development of the students, helping the student develop a sense of responsibility and increasing the motivation of the student towards work. However, it is known that teachers experience problems in the process as well. According to the results of the study conducted by Yasul and Samancı (2015) with class teachers, the difficulties experienced by the teachers during the implementation process include the inability to organize the division of work, the mismatches in groups, the difficulties experienced in making a common decision, and some students' avoidance to take responsibility for their homework and attempt to burden it on their classmates. Prospective teachers in our study also express similar problems in the application of role-playing technique. Rojas and Villafuerte (2018), who examined the effect of role-playing technique on foreign language learning, implied that some teachers refused to use role playing technique in the classroom environment because it created chaos (noise, laughter, discomfort). In addition, Kumaran (2017) states that most of the teachers in the study did not use the role-playing technique as a speaking activity due to time constraints, insufficient role-playing materials and challenges in classroom control. In order to minimize the problems experienced during the practice, according to Duxbury and Ling (2010), teachers should motivate students as much as possible to perform well when using the role-playing technique. The experiences of well-motivated students enable them to retain their knowledge in mind for a long time (Tran, 2014).

The results of the study reveal that the underlying reason why some students are reluctant, unwilling, and escaping from their duties in the implementation of the role-playing technique is that they in fact experience of the fear of failure. The data from their findings also reveal that most of the teacher candidates participating the study did not have stage experience during their school years, and therefore, experienced emotions such as 'I can't do it', 'I will forget the lines', and 'I will be disgraced'. Based on these data, it can also be thought that some students' reluctance to take part in group studies stemmed from inexperience.

As for the opinions of the participants regarding the suggestions for the application of the role-playing technique in the lecture skills lesson, teacher candidates made the following suggestions: *it should be applied more frequently, sufficient time should be given for studies, individual assessment should be made, appropriate space and equipment should be provided, subject selection should be determined in advance, equal role sharing should be made, and English Drama Club should be created*. In order to minimize the problems experienced by teacher candidates in the application process of role-playing technique and to provide a more effective and efficient teaching and learning environment, their suggestions can be taken into consideration in group works. Preservice teachers believe that after the stage performances, evaluation will be more effective when it is made individually not collectively. The results of the study by Erdamar and Demirel (2010) support this belief. According to Erdamar and Demirel, some of the important problems that should be emphasized and resolved are that some pre-service teachers do not fulfill their responsibilities in group work and do not contribute to group work. Some of the participants are of the opinion that they have difficulty in choosing the topic and spend a lot of time for this. In order to eliminate this problem, they suggest that it would be more appropriate for the topics to be determined beforehand by the instructor. According to Yasul and Samancı (2015), in order to use time more effectively, group activities should be carried out within a certain plan and program, and the performance of each student in the group should be evaluated separately. Preservice teachers believe that the application of drama techniques will positively contribute to their professional competences. The creation of the English Drama Club may provide opportunities for frequent use of this practice. Participants made suggestions about the importance of space and equipment for the role-playing technique to reach its goal efficiently. For such applications, having an equipped

classroom with a large stage in the faculty can provide a more suitable environment for both rehearsals and presentations.

It can be claimed that role-playing technique has a significant effect on students' achievement of learning outcomes. It can be concluded that foreign language teachers' using drama activities in lectures can help make lessons more enjoyable and achieve permanence in learning. According to Dündar (2012), drama activities facilitates the learning of four language skills by integrating reading, writing, listening and speaking activities in the same context. As a result of the study, it was concluded that students think that drama activities lead to effective learning despite the challenges involved. Based on the results of the study, it is known that the application of the role-playing technique, which is considered as one of the drama activities, may be also be beneficial to the professional development of prospective teachers. Using drama in foreign language learning classes can improve the self-confidence of prospective teachers in terms of applying drama activities in their professional lives.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE IMPACT OF ELLIPSES ON READING COMPREHENSION

Research Article

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THE IMPACT OF ELLIPSES ON READING COMPREHENSION

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Abstract

This study aimed to detect the extent to which comprehending elliptical structures predicted reading comprehension. The study utilized a correlational survey model, and participants involved a total of 173 middle school students. Data were collected through two different tools based on the same text in 2019. The ellipsis comprehension test consisted of 40 items that included various types of elliptical structures present in the text. These items were in the form of fill-in-the-blanks. The reading comprehension test that was developed based on the same text comprised 21 items in the form of multiple-choice items. The tests were administered to the participants every other day. During the data analysis, a simple linear regression analysis was performed to reveal the extent to which the ellipsis comprehension ability predicted reading comprehension, and a multiple linear regression analysis was employed to reveal the extent to which the sub-dimensions of ellipsis comprehension ability predicted reading comprehension. Enter method was used in the regression analysis. Findings showed that ellipsis comprehension was a significant predictor of reading comprehension. The elliptical sub-dimensions predicting reading comprehension the best appeared to be the ellipses in the form of verb, object and determinative units. However, it was also found that ellipses in the form of subject and indirect object did not significantly predict reading comprehension.

Keywords: Ellipsis, reading, comprehension, cohesion, narrative.

1. Introduction

There are a wide range of variables affecting comprehension ability and achievement. However, reading in essence depends on the nature and quality of interaction between the reader and the text (Cohen and Cowen, 2008; Larson and Marsh, 2005). While the reader performs reading using his/her repertoire of skills alongside his/her language and world knowledge, the text offers an encoded content owing to its structural characteristics. The discourse used in the text content is structured through the connection of sentences in semantic and grammatical aspects (Crystal, 1992). The achievement in reading act depends on the analysis of these connections.

One of the operations in reading comprehension is decoding the grammatical relations of the text. Grammatical relations ensure the cohesion of the texts, turn it into a coherent system and reflect the path through which signification will take. They also help the reader to correlate the pieces of information and thereby facilitate the comprehension (Gernsbacher, 1990; McNamara et al., 2014). The relations constituting the cohesiveness emerge with the tools under two main categories: lexical and grammatical (Halliday and Hasan, 1976). The text, which is the object of the comprehension act, becomes cohesive with the grammatical relations and transforms into a discourse that creates a semantic system (Martin, 2001). Tools such as anaphor, ellipsis, substitution, and conjunctions are employed for grammatical cohesion. Ellipses constitute just a type of these cohesion tools that create the discourse.

Text and reading

Although reading is an act of making sense of the context, this does not necessarily mean that every reading would result in quality comprehension. The transformation of the information provided in the text to the coherent mental representation of the individual is dependent on many components such as the reader, text, reading act, context etc. *Reader and text*, among the other components affecting reading, are more prominent compared to others (Duke, 2003; McNamara and Magliano, 2009). The skills possessed by the reader, as the subject of the comprehension act, and the structural characteristics of the text determine the level at which comprehension will take place.

Comprehension occurs by relating two or more pieces of information (Kintsch, 1999). The information in the reader's memory and the text constitute the source of sense-making. The relevant body of information in the reader's memory and the information coming from the text are held in the working memory and processed (Baddeley, 1986). The information coming from the text while reading updates the schematic knowledge in the memory and thus ensures comprehension (Kintsch, 1999; Johnson-Laird, 1983). The reader tries to make sense of the content by processing the language in various ways while decoding the text. Therefore, reading comprehension is also described as the act of generating meaning through the text (Kintsch, 1998; van Dijk and Kintsch, 1983). Reading process is completed with the mental representation of the textual meaning that is integrated with the prior knowledge of the reader.

The reader is expected to have certain skills and abilities to ensure that the act of reading results in coherent sense-making with the text. One such skill is the ability of decoding. Whilst reading, the reader performs decoding. Decoding is the ability to make a semantic value out of the input coming from the text (Hoover and Gough, 1990). Comprehension is a product of the decoding act (Gough and Tunmer, 1986). Another skill a reader should have is fluency and use of strategy. Fluency affects the capacity of the working memory during reading and thereby accelerates the speed of lexical recognition (Kuhn and Stahl, 2003) while strategies play a facilitating role in the reader's comprehension processes if the text is lengthy and complex. The strategies that are informed and goal-directed (Kirby, 1988) can be considered as different techniques that are processed based on the reader and the quality of the text. A reader having such qualities can be more successful in making sense of the text.

Besides the characteristics the reader has, the qualities of a text also play an important role in the success of sense-making. For a text to be of certain quality, it needs to be sufficient in terms of its textual features. Beaugrande and Dressler (1981) address the textual criteria as external and internal phenomena. External criteria are determined based on the principles of intentionality, situationality, acceptability, informativity, and intertextuality while internal criteria depend on the principles of coherence and cohesion. Coherence ensures the logical-semantic relation between the propositions while cohesion focuses on grammatical and lexical linkages between utterances (Uzun, 2011). In other words, coherence is related to macrostructure while cohesion pertains to microstructure. In the construction of the text, coherence and cohesion mutually affect one another.

If the text is cohesive in terms of grammar, this would support the reader in the sense-making process. While a text with a high level of cohesion has a positive effect on the reader, a text with a low level of cohesion may cause the reader to make more inferences in order to grasp the message of the text (McNamara et al., 2010). This might lead to the misinterpretation of the text content. In addition, previous research showed that texts with a clear use of cohesive devices can be understood better (Beck et al., 1991; Graesser et al., 2003; Ozuru el at., 2009). Cohesion has a positive effect on the comprehension of the text (Beck et al., 1984;

Linderholmet al., 2000). Therefore, it could be safe to say that cohesive devices are among important components for comprehending the texts with a written language code.

Cohesive devices guide the reader in realizing the relations between textual segments during the reading process. While grammatical relations between words and utterances turn the text into a connected discourse, they also establish the lexical and semantic relations that are necessary for sense-making (Kennedy, 1998). Reading comprehension is performed by taking these relations as a basis. In this sense, cohesive devices are principal textual components not only because they ensure the arrangement of the text, but also because they describe the content to the reader meaningfully (Hinkel, 2001). Owing to the cohesive devices, the text is no longer a pile of sentences but a system in which each unit interacts with each other in certain ways.

In the description of cohesion that is enacted with different devices in the text, interpretation of an element in the discourse is highlighted to depend on the accurate interpretation of another element (Halliday and Hasan, 1976). Consistency relations that make up the microstructure of the text offer ways of reaching the deep structure of lexical relations. In this way, each element becomes a reference point for making sense of other elements. These relations between units are ensured with references, connectors, commutations and ellipses (Halliday and Hasan, 1976; Halliday and Mathiessen, 2014; Keçik and Uzun, 2003). Each of these contributes to the sense-making in line with their own qualities. References, connectors and substitutions existing in the text with clear lexical segments are processed similarly by the reader. However, ellipses do not exist with the clear presence of a lexical segment. They are ellipted from the surface of the text, and therefore require a different type of processing. Correctly processing the ellipses that determine the intensity of the text may significantly affect comprehension.

Ellipsis and elliptical structure

Ellipsis is omitting an element that was previously present in the text from the surface structure (Uzun, 2011). Units that are not tangibly found in the oral or written narrations but the meanings of which are easily grasped are processed as ellipted elements. For instance, in the utterance "*Man likes walking, so does the woman*" the second proposition's verb is ellipted; however, although this unit is not used in the text, it still can be sensed. That is why Halliday and Hassan (1976) argue that ellipsis is a thing that is not said out loud and yet is understood. Ellipsis is a cohesive device that is applicable to only units that can be re-added to the utterance (Quirk et al., 1972). The ellipted unit is not seen in the surface structure but assumes a semantic role in the utterance.

Depending on the quality of the ellipted element, there are three types of elliptical structures. *Nominal ellipsis* is the omission of the head noun within the nominal group. *Verbal ellipsis* is the omission of the verb, and *clausal ellipsis i*s the omission of a clause (Halliday and Hassan, 1976). The way the elliptical element is omitted may vary by the language structure.

There are different approaches to the way an elliptical element is understood in an utterance. One of them is based on the syntactic parallelism principle. Based on this approach, the elliptical element is understood by comparing the utterance, in which the relevant element is present, and the structure of the unpronounced constructions (Fiengo & May, 1994; Merchant, 2001). According to this approach, the blanks in the sentence "*The woman […] to stay home in […]*" is interpreted and comprehended as "*The woman likes to stay home at her leisure*" as a result of the inference made from the structure of the sentence "*The man likes to walk at his leisure*". As for the semantic approach, this approach argues that syntactic structure has no effect in ellipses, and that this is related to semantic quality (Dalrymple, Shieber, & Pereira, 1991; Hardt, 1993). Kehler (2000) states that only when syntactic parallelism exists between two utterances in elliptical structures, this can serve as a means in inferencing of an elliptical

element. The functionality of these approaches compared to each other can be revealed from the nature of the context in which ellipses are present.

There are three types of analytical approaches for elliptical structures besides syntactic and semantic approaches (Aelbrecht, 2010). Among them is nonstructural approach according to which syntax is coherent with the vocalic realization and there is no syntactic structure related to the utterance apart from the heard utterance (Ginzburg & Sag, 2000; Culicover & Jackendoff, 2005). Besides this, null proform assumes that there is a null element in the syntax and it substitutes the elliptical element. This proform does not possess a syntactic structure; its meaning is inferred from the antecedent unit. According to some researchers, this operation is similar to making inferences from pronouns (Hardt,1999; Lobeck, 1995 and Depiante, 2000); however, there are those who advocate that this operation is done by copying the structure in the antecedent to the elliptical site (Fiengo & May 1994; Chung et al., 1995; Wilder, 1997; Beavers & Sag, 2004; Fortin, 2007). The third approach being PF-deletion asserts that there is no such thing as syntactic structure, and that it is only possible to remove the unpronounced content because there exists an antecedent that complement an elided clause (Merchant, 2001). A reader performs one of these operations when s/he encounters an ellipsis in the text.

In order to use an elliptical structure, there are two conditions that must be met. The first condition is the principle of recoverability. Accordingly, a structure can only be ellipted if there is an antecedent. The second condition is the principle that ellipsis can be realized only in correct syntactic structures that allow ellipsis (Aelbrecht, 2010). In the absence of these, it is not possible to use an elliptical structure.

The ellipsis is mostly made between the units in the sentences forming structural connections on the surface of the text. The exact form of the structure is specified before the sentence in which ellipsis is present, and based on this, the common unit in the next sentence is omitted (Beaugrande and Dressler, 1981). To set an example to such use; "A*: I like cinema very much*. B:"*Me too…*".

In written or spoken texts, ellipsis is generally used for reasons of economy in the language and of emphasizing the style (Crystal, 1980). The use of ellipsis provides benefits such as reducing the size of the text, word saving and economy, and eliminating unnecessary recursive. Thus, the texts become more comprehensible. In addition to this, rhetorical beauty can be created through ellipsis. The resulting style can make the text denser and more comprehensible. Narrative gains originality in this way. The reader's or addressee's perception of the ellipses depends on their inference from the given items. Inferences to be made will remove the semantic disconnection between the units of the text.

The ellipsis must be used moderately in the text. When used excessively, the principle of *adequacy* reflecting the organizing functions may not be achieved and textuality may be eliminated relatively (Beaugrande and Dressler, 1981). In order to avoid semantic problems that may occur due to ellipsis, it is necessary to take into account the prior information of the addresser and the addressee. In this regard, it can be said that ellipted structures have a relation with the world knowledge in addition to language knowledge.

Relation between ellipsis and reading

Elliptical structures are an integral part of natural language. It is not related to a particular language, but a universal feature in all languages (McCarthy, 1996). Wherever linguistic processing exists, elliptical structures can be used in oral or written language or in different forms and qualities between different languages (Parrott, 2000). The contribution of ellipses to sense-making during reading depends on whether they have been used sufficiently or on the contrary, used more than necessary. If information that should be ellipted are not ellipted, such

information becomes excessive (Grand-Davie, 1995). Repeating the information that the reader already has during the reading process creates interference with the sense-making process. On the other hand, excessive use of ellipses will negatively affect reading as it will prevent the unpronounced unit from being understood.

The effect of ellipses on reading comprehension is addressed in two points. The first point is that the reader has sufficient prior knowledge for the inference of the ellipted unit. If the reader has sufficient prior information, elliptical structures support reading comprehension. The second point is that the ellipses guide the reader to make inferences (Grand-Davie, 1995). Inference is one of the important components of reading comprehension (Garnham and Oakhill, 1996; Graesser et al., 1994; Singer, 1994). Elliptical structures enable the reader to infer, making him/her a more effective decoder and ensure the creation of common assumptions between the writer and the reader. However, readers who do not have prior information to complement the ellipted units by inference, or who cannot transfer the antecedents in the text to the elliptical site, may experience various problems in comprehension.

Reading comprehension is a process that includes many sub-components. Elliptical structures constitute only one of such components but constitute an important one. The purpose of this study is to determine the extent to which reading comprehension abilities of individuals, who correctly process and make sense of elliptical structures, differ from those of the others. To this end, the study sought an answer to the following question: "*To what extent do elliptical structures predict reading comprehension*?"

2. Method

This research adopted the correlational survey model. This model tries to determine the existence or degree of co-variation among variables (Karasar, 2003). The variables taken into consideration in the research are the level of understanding elliptical structures and the success in reading comprehension. Since the study is conducted to determine to what extent elliptical structures predict reading comprehension, the correlational survey model was employed.

2.1. Participants

The participants of the research are 173 middle school students who continue their education in the center of Antalya province. 44 students from 5th grade, 44 from 6th grade, 43 from 7th grade and 42 from 8th grade participated in the study, which included students from all grade levels. 90 of the participants are female and 83 of them are male students.

2.2. Data collection tools

The data were collected using two different tools: Ellipsis Comprehension Test and Reading Comprehension Test. Both of these tools were developed based on the same story. The reason as to why the same story was chosen for both tests is the idea that in this way, more realistic results can be achieved regarding in terms of the extent to which the level of comprehending ellipses predicted the level of reading comprehension success. For this, Yaşar Kemal's story, *Avcı* (Hunter), was chosen in line with the expert opinion. Four different experts noted that the story was appropriate for the level of middle school students.

While developing the Ellipsis Comprehension Test, all the ellipses in the story were removed. Then they were classified according to their types and one of the elliptical structures that were similar to each other and made reference to the same unit was taken and the others were eliminated. In this way, a total of 40 elliptical structures was determined. Of these elliptical structures, 16 of them were referring to the subject, 7 to the verb, 10 to the determinative, 5 to the object and 2 to the indirect object. All of these units were included in

the test and presented as fill-in-the-blanks questions in the story. One of the questions in the Ellipsis Comprehension Test is:

> *It is a wide flat plain between the Hemite mountain and Anavarza. Savrun stream mixes into the Ceyhan river right at the end of Anavarza. A reeds stretch from where the stream mixes into Ceyhan to the village of Vayvaylı. At the time of day, grizzly smoke falls across Akcasaz, Mount Hemite, Anavarza and Vayvayli. More precisely, it fumes like a smoke rather than a fine mist [1. What's the smoking thing? ....].*

The Reading Comprehension Test was also prepared based on the same story. The test included a total of 21 questions. The questions were created taking into account Bloom's revised taxonomy. In the test consisting of multiple-choice items, each item has four options. After the draft form of the test was developed, expert opinion was received from four different experts and necessary revisions were made in line with their feedback. Then, a pilot study was conducted with a group of 20 people and updates were made regarding the language problems encountered.

After administering the test to the participants, statistical analyzes were carried out. The missing values and outliers were examined before starting the analysis. No missing value was found in the dataset. However, there were 3 outliers (subjects 2, 111 and 124) and these were excluded from the dataset. Then, the item and test statistics of the Reading Comprehension Test were calculated. For item statistics, high-low 27 percent (46 persons each) groups were formed. The test statistics of the Reading Comprehension Test are presented in Table 1.

Table 1. *Reading Comprehension Test statistics*

Statistics related to Total Scores	Value
N	170
Mean	9.871
Median	10.000
Mode	9.000
Std. Deviation	3.257
Skewness	0.069
Kurtosis	-0.443
Minimum	2.000
Maximum	18.000

When Table 1 is analyzed, it is seen that the averagesuccess of the 170-people group is 9.87. The lowest score on the 21-question test is 2, the highest score is 18. The mean, mode and median being close to each other indicates normal distribution of data. Half of the points are greater than 10 and half are less than 10. The skewness and kurtosis coefficients in the range of ± 1 indicate that the dataset follows normal distribution.

The item statistics of the items in the Reading Comprehension Test are shown in Table 2.

Table 2. *Reading Comprehension Test item statistics*

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
Difficulty	0.478	0.696	0.457	0.587	0.446	0.565	0.565	0.250	0.696	0.402	
Discrimination	0.478	0.478	0.391	0.435	0.326	0.609	0.391	0.196	0.304	0.543	
Mean	0.488	0.735	0.465	0.582	0.429	0.665	0.647	0.218	0.700	0.376	
Std. Deviation	0.501	0.442	0.500	0.495	0.496	0.473	0.479	0.414	0.460	0.486	
Skewness	0.047	-1.076	0.143	-0.337	0.288	-0.704	-0.621	1.381	-0.881	0.514	
Kurtosis	-2.022	-0.852	-2.003	-1.909	-1.940	-1.522	-1.634	-0.095	-1.239	-1.756	
	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21
Difficulty	0.674	0.239	0.370	0.446	0.457	0.098	0.478	0.272	0.543	0.467	0.772
Discrimination	0.391	0.304	0.391	0.587	0.197	0.022	0.435	0.065	0.652	0.543	0.283
Mean	0.671	0.218	0.312	0.459	0.435	0.129	0.459	0.265	0.412	0.418	0.788
Std. Deviation	0.471	0.414	0.465	0.500	0.497	0.337	0.500	0.442	0.494	0.495	0.410
Skewness	-0.732	1.381	0.820	0.167	0.263	2.228	0.167	1.076	0.362	0.337	-1.424
Kurtosis	-1.481	-0.095	-1.344	-1.996	-1.954	2.998	-1.996	-0.852	-1.892	-1.909	0.027

When Table 2 is analyzed, it can be seen that item difficulty indices change in the range of 0.098-0.772. As the item difficulty index approaches 0, the item becomes more difficult and as it gets closer to 1 it becomes easier. For item difficulty, the range of 0.00-0.40 indicates that the item is difficult, the range of 0.41-0.60 indicates that the item is of medium difficulty, and the range of 0.61-1.00 indicates that the item is easy (Frankel and Wallen, 2000; Wiersma and Jurs, 2005). It is seen that 4 items in this study are easy, 12 items are of medium difficulty and 5 items are difficult.

The item discrimination is the degree to which the item distinguishes between those who are knowledgeable and those who are not and varies within ± 1. For item discrimination, items that range between 0.40 and above are very good discriminators, those that range between 0.30-0.40 are good discriminators and the ones that range between 0.20-0.30 are moderate discriminators, and finally items with values below 0.20 as well as negative values should not be used (Wiersma and Jurs, 2005). In this study, 9 items were very good discriminators, 7 items were good discriminators and 1 item was a medium discriminator. 4 items (items 8, 15, 16 and 18) were determined to be very low discriminators for this study group and thus needed be removed. For this reason, these items were excluded from the analysis.

The split-half reliability of the test was calculated as 0.641. Although the recommended threshold value is 0.70 and above, values of 0.60 and above are also acceptable (Hair et al., 2014). One reason for the reliability coefficient to be below 0.70 is thought to be related to having prepared all items based on the same story. Despite this limitation, for the reliability of the findings, it was compulsory to determine the success in ellipsis comprehension and the reading comprehension level using data based on the same foundation.

2.3. Data collection and analysis

The data were collected in two different sessions. The participants were first given the ellipsis test and asked to respond to the questions within 30 minutes. A Reading Comprehension Test was given one day after this application. The application time of the test was again limited to 30 minutes. Participants who received only one of the tests were not included in the study. A total of 173 participants attended both sessions, but three were excluded from the study because they were outliers. Thus, the data were obtained from 170 participants.

A simple linear regression was conducted for the extent to which the success in comprehending ellipses predicted reading comprehension, and a multiple linear regression analysis was conducted for the extent to which the sub-dimensions of the success in comprehending ellipses predicted reading comprehension. Enter method was used in regression analysis.

3. Findings

Simple linear regression was conducted for the extent to which the success in comprehending ellipses predicted reading comprehension. The results of the regression analysis are presented in Table 3 and Table 4.

Table 3. *Model summary and ANOVA results*

	Sum of squares	sd	R	R^2	F	p
Regression	515.216	1	.557	.310	75.563	.000
Residuals	1145.490	168				
Total	1660.706	169				

As seen in Table 3, the relationship between the predictor (independent) variable and the dependent variable was calculated as 0.557. This relationship is at a medium level. The success of individuals in comprehending the ellipses explained 31% of the variance related to their reading comprehension success. When the results of the analysis were examined, it was seen that the model established for individuals to determine how their success in comprehending ellipses predicted their reading comprehension was significant, $F(1, 168) = 75.563$, $p < 0.05$.

Table 4. *Regression model*

Variable	*Coefficient*	*Std. Mistake*	β	t	p
Fixed	3.265	.670		4.873	.000
Ellipsis	.229	.026	.557	8.693	.000

According to the t-test results related to the significance of the regression coefficient presented in Table 4, the success in comprehending ellipses was a significant predictor of reading comprehension achievements.

According to the results of the analysis, the regression equation regarding predicting the success in reading comprehension is as follows:

Success in reading comprehension = 3.265+ 0.229 success in comprehending ellipses

When the model was examined, an increase of 1 unit in the success in comprehending ellipsis resulted in an increase of 0.229 unit in the reading comprehension success. In other words, the student who gets 10 points more from the Ellipsis Comprehension Test will get 2.29 points more in the Reading Comprehension Test. In this case, the score the student who gets 100 points from the Ellipsis Comprehension Test is expected to increase by 22.9 in the Reading Comprehension Test.

In the multiple linear regression analysis conducted to determine the extent to which sub-dimensions related to elliptical structures predict reading comprehension success, subject and indirect object sub-dimensions were not found to be significant predictors. The analysis was repeated for the remaining sub-dimensions. Multiple linear regression analysis results are presented in Table 5 and Table 6.

Table 5. *Model summary and ANOVA results*

	Sum of squares	sd	R	R^2	F	p
Regression	560.182	3	.581	.337	28.165	.000
Residuals	1100.524	166				
Total	1660.706	169				

The correlation between the predictor variables and the dependent variable was calculated as 0.581. This correlation is at a medium level. The verb, determinative and object sub-dimensions scores of individuals in terms of their success in comprehending ellipses explained 33.7% of the variance related to their reading comprehension achievements. When the results of the analysis were examined, it was seen that the model established for individuals to determine how their verb, determinative and object sub-dimension scores in terms of success in comprehending ellipses predicted their reading comprehension was significant, $F(3, 166) = 28,165$, $p < 0.05$.

Table 6. *Regression model*

Variable	Coefficient	Std. Mistake	β	t	p	$r_{bivariate}$	$r_{partial}$
Fixed	3.120	.758		4.114	.000		
Ellipsis_Verb	.203	.122	.112	1.671	.097	.293	.129
Ellipsis_Determinative	.473	.126	.319	3.755	.000	.528	.280
Ellipsis_Object	.616	.200	.264	3.073	.002	.513	.232

When the bivariate and partial correlations presented in Table 6 were analyzed, there appeared a low positive ($r_{bivariate} = 0.293$) relationship between the verb sub-dimension of success for comprehending ellipses and reading comprehension success, and it was seen that this relationship decreased ($r_{bivariate} = 0.129$) when the head and object sub-dimensions of success for comprehending ellipsis were controlled. It was seen that there was a medium level relationship ($r_{bivariate} = 0.528$) between the determinative sub-dimension of success for comprehending ellipses and reading comprehension success, and it was found that this relationship decreased ($r_{partial} = 0.280$) when the verb and object sub-dimensions of success for comprehending ellipsis were controlled. A medium level relationship ($r_{bivariate} = 0.513$) was observed between the object sub-dimension of success for comprehending ellipses and reading comprehension success, and it was seen that this relationship decreased ($r_{partial} = 0.232$) when the verb and determinative sub-dimensions of success for comprehending ellipsis were controlled.

According to the standardized regression coefficients (β), relative importance sequence of predictor variables for the success in reading comprehension was determinative, object and verb respectively. According to the t-test results related to the significance of the regression coefficient presented in Table 6, verb, determinative and object sub-dimensions of success in comprehending ellipses were significant predictors of reading comprehension.

According to the results of the analysis, the regression equation with regard to predicting the success in reading comprehension is as follows:

Reading comprehension success = 3.120 + 0.203 Verb + 0.473 Determinative + 0.616 Object

When the model was examined, it was seen that a 1-unit increase in the verb sub-dimension of the success in comprehending ellipses resulted in an increase of 0.203 in the success in reading comprehension. It was seen that a 1-unit increase in the determinative sub-dimension

of the success in comprehending ellipses resulted in an increase of 0.473 in the success in reading comprehension. It was found that a 1-unit increase in the object sub-dimension of the success in comprehending ellipses resulted in an increase of 0.616 in the success in reading comprehension.

4. Conclusion and Discussion

Findings obtained from the research revealed that correct processing of elliptical structures support reading comprehension. Reading takes place through the semantic analysis of a text that is decoded in writing. The interpretation of the text is based on understanding the sentences that make up it. The ellipses are decoding units processed at the sentence level (Lappin, 1996; Fiengo & May, 1994). While the grammatical system of the sentences that compose the text is decoded, a mental process is carried out in order to reach the sentential and textual meaning as a requirement of the act of reading. Therefore, correct processing of ellipses is the equivalent of performing one of the multiple processes carried out to understand the text that is being read.

Written texts consist of linking sentences in semantic and grammatical terms. The ellipses constitute one of the processes that ensure the structuring of sentences (Chomsky, 1971). The reason for applying ellipses in the structure of the sentence is to avoid recursion. On the other hand, elliptical structures are not found in every sentence; they can be used only if there is no change in the sense of the sentence when an element in that sentence is omitted from syntax (Swan, 1996). Therefore, even though the ellipses are omitted from the surface of the text, they are the units that continue to play a role in the content of the text. Only the physical existence of the ellipted unit is omitted from the sentence, not its semantic presence. Since the holistic meaning of the text is reached through sentences during the reading process, the ellipted units must be processed and interpreted in the same way as the explicitly used units. This is thought to be another reason for ellipses reinforcing the reading.

It is possible to make sense of the ellipses of a written text scattered in different sites during reading by reversely thinking its way of formation. Elliptical structures have two basic elements: *antecedent and ellipted unit* (Hardt, 1993; Lascarides & Asher, 1993; Kehler, 2000). During the reading, the relevant processing takes place first by detecting the ellipted unit and then establishing its correlation with the antecedent. Prior to the process of creating the text, the antecedent is first structured and then a suitable unit is eliminated from the surface of the structure. Successful reading in terms of elliptical structures is based on linking the antecedent to the ellipted unit through appropriate operations. Reading and comprehension are relatively unsuccessful when the necessary linking is not established.

With regard to the conditions about the correct processing of the ellipses, two different approaches can be seen in the literature. In studies based on the semantic approach, the relation between the ellipted unit and the antecedent is based on the semantic partnership (Webber, 1979; Lappin, 1984; Gawron & Peters, 1990). In contrast, approaches based on syntax link the same partnership to syntactic structures (Reinhart, 1991; Fiengo & May, 1994). However, in some studies, it was determined that the readers can understand the ellipses to some extent even when there is no syntactic antecedent (Arregui et al., 2006; Kim et al., 2011; Kim & Runner, 2018). Therefore, it is suggested that the relation that provides understanding of ellipses may not be established with semantic or syntactic structures alone, but it may be better to look at the context and nature of ellipsis instead (Arregui et al., 2006; Frazier & Clifton, 2006; Kehler, 2002; Kertz, 2010). Comprehension can be enhanced by the reader's reaction through an operational response appropriate to the type of the ellipses in the sentences in order to obtain overall meaning of the text during reading.

Reading comprehension requires structuring the message of the text accurately and effectively. The units that play a role in the realization of the comprehension are reader, text, process and sociocultural context (Sweet & Snow, 2002). These units are interactive during reading. The subject of the interpretation in reading is the reader, and the object is the text. The reader establishes a mental connection with various linguistic situations in the text and creates a conceptual structure related to the content of the text (Kendeou et al., 2007). The success of the reader in his interaction with the text is based on his ability to decode the system including the ellipses, establishing the connections between the units of the text and interpreting the content in a consistent manner with the sociocultural context (Grabe, 1988; Eskey, 1988; Zhenyu, 1997). Although linking of the antecedent that constitutes the ellipses to elliptical site is only one of the actions performed in the cohesion dimension of the text, this process significantly affects the reading comprehension success.

It is also important that the reader has a good semantic and syntactic skill since reading comprehension involves making sense through text. Research has revealed that readers with insufficient semantic and syntactic skills cannot make sense of sentences and phrases (Nation and Norbury, 2005; Nation and Snowling, 2000). On the other hand, individuals who are inadequate in terms of inference ability, which plays an important role in the processing of ellipses, also have problems in comprehension (Cain & Oakhill, 2007). The ability to clearly monitor the effect of ellipses in reading depends on the fact that other sub-skills affecting reading are sufficient.

In addition, remarkable results regarding elliptical sub-dimensions in Turkish language were obtained from the study. According to this, it was determined that ellipses in the form of especially verb, determinative and object are significant predictors of reading comprehension whereas ellipses in the form of subject and indirect object are not significant predictors of reading comprehension. These findings should be examined primarily in relation to the structure of Turkish language. Turkish is a language that works with suffixes, and since the constituent units are connected to the verb through suffixes, there is syntactic flexibility. In this study, elliptical structures are handled through the structural constituents of the sentence. It is thought that the ellipses in the text used follow a distribution compatible with the structural features of Turkish, and that this determines the level of comprehension to a certain extent.

Ellipses are generally addressed in three terms as noun, verb and clause ellipsis (Halliday and Hasan, 1976; Merchant, 2012). From the aspect of the constituent units of the sentences, verb corresponds to verbal ellipsis and the other units to the noun ellipsis. The clausal ellipses are formed by omitting the non-restrictive and prescriptive phrases. Each of these ellipses requires complementing the ellipted units with different linguistic elements. The verb, object and determinative which are significant predictors of reading comprehension are of verb and noun ellipses. On the other hand, subject and indirect object that are not significant predictors of reading are of the noun type. Based on this, it can be said that the types of the ellipses are not decisive in terms of predicting reading comprehension within the bounds of the findings of this research.

The difference between the types of ellipsis that predict and do not predict reading may be related to the fact that the type of the text used in the research was narrative. Altman (2008) considers the narratives a series of successive events arranged. Successive phrases require the continuity of certain elements in the same context. For this reason, the units known by the reader can be ellipted in various situations depending on the style created. Style is a primary element in narratives (Simpson, 2004). The style that constitutes the literacy is structured by the use of language, which may cause elliptical structures to be used differently than in natural language for communicative purposes. Verbs that describe events in narratives, objects

affected by verbs, and a word belonging to a part of a determinative can often be ellipted in the flow of a text. The use of such a language draws the reader more into the world of the text in accordance with the nature of the narrative. The sub-dimensions of elliptical structure that predict comprehension in the research can be explained by this fact.

It can be said that the subject and indirect object ellipses that do not predict reading show a different appearance within the structure of Turkish language when compared to other types in terms of the distance between the antecedent and the ellipted unit. In this sense, even if the subject in Turkish, which has a structure working with suffixes, is ellipted from the syntax, its presence can be seen in the verb with the relevant suffix attached to it. Therefore, it is difficult to talk about a complete ellipsis when it comes to the subject. The subject is generally used with a half elliptical structure in Turkish. Similarly, in ellipsis with regards to indirect objects, this type of ellipsis may have been more easily understood in this research, since the distance between the antecedent and the ellipted unit is less than the others. This is because the ellipted unit is complemented with the closest unit to it (Rosyidah, 2019). A process in which the reader has no difficulty in reading may not predict comprehension.

As a result, the ellipses, which are one of the cohesive devices that make up the text, are a significant predictor of meaning. The quality of the ellipted unit related to the sub-dimensions affects reading at different levels. Elliptical structures in narrative texts make individuals more effective in carrying out operations in reading. Apart from these findings, it is suggested to investigate to what extent other cohesive devices predict reading comprehension and how these differ according to the individual characteristics of the readers.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE EFFECT OF CRITICAL THINKING SKILLS AND EMOTIONAL INTELLIGENCE ON THE EPISTEMOLOGICAL BELIEFS OF STUDENTS IN A CHILD DEVELOPMENT PROGRAM

Research Article

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Abstract

The scientific and technological advances in the current information era have given rise to the need for qualified work force. Individuals are expected to assess their strengths and weaknesses, to have curiosity, to be able to think rapidly and to make accurate decisions, in broader terms, they should have the abilities to think critically, to use emotions in ingenious, sensitive, beneficial and sensible ways, and should be aware of the significance of epistemology. The present study was intended to measure the effect of critical thinking skills and emotional intelligence on the epistemological beliefs of the students enrolled in a Child Development program in a higher education institution. Given such an objective, the Emotional Intelligence Scale, the Critical Thinking Scale and the Epistemological Belief Scale were administered to 102 participant students who were selected via convenient sampling model in the Child Development program of a Vocational School of Health Services in a state university in Turkey. In the data analysis stage, the scale sub-dimensions of skewness and kurtosis values were initially examined in and later on the multivariate normality analysis, multi correlation tests between variables and multiple linear regression tests were performed. The findings revealed that when the "perception" sub-dimension, one of the six dimensions of emotional intelligence increased, the "effort" sub-dimension in epistemological beliefs decreased.

Keywords: Child development, epistemological beliefs, emotional intelligence, critical thinking, Vocational School of Health Services

1. Introduction

Having diverse thinking skills has become a requirement for individuals as a result of the new realities and socio-economic developments in today's modern world. Instead of pure information exchange, learning how to think has become essential in every education system globally. The schools target to train individuals who have highly developed metacognitive learning strategies with the skills of questioning, accessing information, thinking critically, and producing ideas.

Assumptions, generalizations, prejudices, and stereotypes affect the individuals' perceptions towards their environment and their behaviors. Cognitive models adopted by the individuals also affect their behavior (Paul, 1984). Critical thinking skills are essential for managing such situations in a robust manner.

Critical thinking skill is defined as the ability to approach, comment, and decide on issues in an inquisitive manner. It includes sub-skills such as establishing cause and effect relationship, revealing similarities or differences in details, categorizing based on certain criteria, determining the appropriateness and validity of information, analyzing, evaluating, interpreting, and making inferences (Karadüz, 2010).

The conflict between the rational and the emotional thinking has been considered as one of the most important discussions since the ancient period. Such a conflict constitutes the core of the debates among the gods of the ancient Greek. It is known that Stoics introduced the idea that emotions harm individuals and the only means for a good life was the use of reason and logic and Christian philosophy continued with the idea that emotions were the elements of evil.

Since the Renaissance era, it has been considered that the mind symbolizes everything that is good, right, and robust, and emotions are the weaknesses in individuals. The Industrial Revolution, which started due to the discovery of steam, resulted in an absolute dominance of mind over emotions, a reality that was not even questioned by the society. The myth of rationality emerged and led to widespread views, such as, rationality was the sole solution to problems and emotions prevented rationality (Robbins, 2000).

Studies in psychology in the early 20th century, the social responses that were freely expressed by the Europeans since the 1960s, and the current developments in science introduced the notion that the emotions of individuals were not detached from their intellectual activities, rather were highly significant for the individuals to sustain their lives. (Çakar and Arbak, 2004).

The most significant characteristics that discern humans from other living beings are their ability to think, question, and investigate. "Knowledge" emerged due to the activities of humans such as meeting their needs, adapting to nature and fulfilling their curiosity since the past to present day. Humans desired to scrutinize what knowledge is, whether accurate knowledge could be obtained, what the value, source, validity, and limitations of knowledge were. Such desire led to the emergence of the philosophy of knowledge or the epistemology discipline (Aydın and Geçici, 2017).

Literature review indicates numerous studies focusing up on different study groups and variables for measuring critical thinking skills (Semerci, 2003; Özdemir, 2005; Akbıyık and Seferoğlu, 2006; Akar, 2007; Şen, 2009), emotional intelligence (Ismen, 2004; Deniz and Yılmaz, 2006; Öztürk, 2006 ; Erdoğdu, 2008; Avşar and Kaşıkçı, 2010; Yılmaz Karabulutlu, Yılmaz and Yurttaş, 2011; Delice and Günbeyi, 2013; Sudak and Zehir, 2013), and epistemological belief (Akgün and Gülmez, 2015; Alpaslan and Ulubey, 2016; Özözen Danacı and Pınarcık, 2017; Gül Biçer, 2019). However, there are no such studies that have investigated the effects of critical thinking and emotional thinking on epistemological belief.

The globalized world requires all members of professions to have the ability to adapt easily to development and innovations, make decisions knowledgeably, produce creative ideas, be flexible, develop own personality, in other words, to use their critical thinking ability (Öztürk and Ulusoy, 2008); to observe and regulate the feelings of oneself and others, use emotions to guide reasoning and action, in other words, to use their emotional intelligence (Yeşilyaprak, 2001); to have an idea about what knowledge is and have epistemological beliefs on how learning and knowing occur (Deryakulu, 2004).

Education starts in mother's womb and continues in formal and non-formal settings of contexts until the end of life. Education programs are constantly transformed and updated to provide an individual model appropriate for the requirements of the era. The pre-school

education constitutes the most rapid and sensitive period of human development. It is acknowledged that education and experiences in the first years of life have important effects on advanced learning ability and future achievements.

Instructor is an important influence in implementing the education programs which were developed, transformed, and updated to bring up individuals appropriate for the requirements of the era. The individual qualifications of an instructor are reflected to students and determine the quality of the education. Preschool instructors and child developers are responsible for preschool education.

Individuals, who are specialized in child development through a two-year degree, evaluate the mental, language, motor, social, emotional development and self-care skills of children between the ages of 0 and 18, who have typical and atypical development, need protection, who work, who are refugees, criminals and hospitalized, and provide services to the child, family, instructors and the society for supporting the skill areas of such children. Child development specialists can influence the life of an individual, contribute to his/her personality development, and bring up individuals who criticize, question, empathize and are knowledgeable.

Given the scope above, the present study aims to scrutinize the answer to the research question of *"Do critical thinking skills and emotional intelligence have an effect on the epistemological beliefs of the students in a Child Development program of a vocational college in a higher education institution in Turkey?"*

2. Method

The research model of the study was the Relational Screening Model the Screening model refers to the totality of the processes that describe a circumstance as exists in the past or in present, facilitate learning and develop anticipated behaviors in an individual. The relational screening model is a screening approach which is intended to determine the presence of co-variation between two or more variables. In relational scanning model the researcher aims to determine whether the variables change together and how the change occurs once it is present (Karasar, 2011).

2.1. Study Group

The study group of the research was composed of 102 students in the Child Development program of a Vocational School of Health Services at a state university in Turkey in 2019-2020 academic year. Out of these 102 students, who were selected via convenient sampling model, 94 were females, and 8 were males.

2.2. Data Collection Tools

The data collection tools of the study comprised; the California Critical Thinking Disposition Inventory (CCTDI), adapted to Turkish by Kökdemir (2003), the Emotional Intelligence Scale, adapted to Turkish by Kayıhan and Arslan (2016), and the Epistemological Beliefs Questionnaire adapted to Turkish by Deryakulu and Büyüköztürk (2005). Detailed information on the scales are as follows:

2.2.1. California Critical Thinking Disposition Inventory (CCTDI)

The inventory was prepared by Facione as an outcome of the "Delphi Report" by the American Society of Philosophers in 1990 and the Turkish validity and reliability studies of the inventory was completed in 2003 by Kökdemir. The internal consistency of the original inventory was determined as 0.88 and the adapted inventory had an internal consistency of 0.82. California Critical Thinking Disposition Inventory (CCTDI) is a six-point Likert-type

scale. The items were evaluated by the expressions "strongly disagree," "disagree," "partly disagree," "partly agree," "agree," "strongly agree" (respectively, 1,2,3,4,5, and 6 points). The lowest and highest scores that can be obtained from the inventory are 51 and 306, respectively. Higher scores indicate higher disposition to critical thinking. The items of the inventory, with the numbers 05, 06, 09, 11, 15, 18, 19, 20, 21, 22, 23, 25, 27, 28, 33, 36, 41, 43, 45, 47, 49 and 50, are scored reversely. The inventory consists of six sub-scales, namely, truth seeking (items 06, 11, 20, 25, 27, 28 and 49), open-mindedness (items 05, 07, 15, 18, 22, 33, 36, 41, 43, 45, 47 and 50), analyticity (items 02, 03, 12, 13, 16, 17, 24, 26, 37 and 40), systematicity (items 04, 09, 10, 19, 21 and 23), confidence in reasoning (items 14, 29, 35, 39, 44, 48 and 51) and inquisitiveness (items 01, 08, 30, 31, 32, 34, 38, 42 and 46).

2.2.2. Emotional Intelligence Scale

Kayıhan and Arslan (2016) adapted the Emotional Intelligence Scale, developed by Hyuneung Lee and Yungjung Kwak in 2011 in South Korea, in Turkish language. The scale was administered to 249 high school students. The three-dimensional model which consists of 20 items was found consistent via confirmatory factor analysis. Internal consistency, item and factor analyses were carried out to examine the psychometric properties of the scale. The reliability analysis provided a Cronbach Alpha coefficient of .83 for the whole scale, and it was calculated as 0.80 for the present study. The results of the confirmatory factor analysis indicated that the three-dimensional model of the scale was compatible with the Turkish sample (x^2=399.55, df=167, RMSEA=.075, NNFI=.90, CFI=.91, IFI=.91, SRMR=.080, GFI=.86). The scale was acknowledged as a reliable and valid data collection tool to measure the emotional intelligence levels in the education processes of students in Turkey.

2.2.3. Epistemological Beliefs Questionnaire

Epistemological Beliefs Questionnaire, developed by Schommer (1990) for university students, was used to evaluate the system of Epistemological Beliefs. The original scale is in English and consists of 63 items grouped under a four-factor structure, namely, the "Innate Ability," "Simple Knowledge," "Quick Learning," and "Certain Knowledge." The scale was adapted to Turkish by Deryakulu and Büyüköztürk (2005) for university students. The Turkish version of the scale consists of three factors and 34 items. The first factor, "belief that learning depends on effort," consists of 18 items, the second factor, "belief that learning depends on ability," consists of 9 items and the third factor, "belief that there is a single truth," is 8 items. Epistemological Beliefs Questionnaire is a five-point Likert-type scale, ranging between the scores (1) and (5), between "strongly disagree" and "strongly agree." High scores refer to immature, underdeveloped, naive beliefs, whereas low scores indicate mature, developed, sophisticated beliefs.

The reliability study of the Turkish version of the scale was conducted by Deryakulu and Büyüköztürk (2005) and the goodness of fit indices determined via the confirmatory factor analysis were X^2 = 1331,96 (sd=524, p <.001), RMSEA = 0.05, RMR = 0.09, SRMR = 0.07, GFI = 0.89 and AGFI = 0.87. Cronbach alpha internal consistency coefficients, calculated to determine the reliability of the scores obtained from the scale in discerning individuals, was determined as 0.84, 0.69 and 0,64 for the first, second and third factors, respectively, and as 0.81 for the whole scale. The values in the present study were calculated as 0.78, 0.76 and 0.68 for the first, second and third factors, respectively, and as 0.79 for the whole scale 0.78.

2.3. Data Analysis

The data obtained were tabulated using Microsoft Excel and analyzed via the SPSS 25 software. The obtained data were first examined for lost and extreme values. Due to the

completion of these examinations, the data set was prepared for analysis. Subsequently, the data set was scrutinized for problems pertaining to multivariate normality and multi correlation, which were designated as the assumptions required to perform a multivariate analysis. After testing the assumptions, multiple regression analysis was conducted to investigate the extent, which the Emotional Intelligence Scale and California Critical Thinking Disposition Inventory scores predicted the Epistemological Beliefs Questionnaire scores of the students.

3. Findings

Descriptive statistics based on the sub-dimensions of the scales are illustrated in Table 1.

Table 1. *Descriptive statistics based on the sub-dimensions of the scales*

		N	Mean	Standard Deviation	Skewness	Kurtosis
Critical Thinking	Truth seeking	102	27.0882	5.37707	-.312	.168
	Open-mindedness	102	48.4510	7.05933	-.730	.992
	Analyticity	102	49.1176	5.57095	-.701	.399
	Systematicity	102	25.7353	4.10005	-.272	-.015
	Confidence in reasoning	102	30.1667	5.22007	-.189	-.410
	Inquisitiveness	102	39.0000	4.91311	-.276	-.231
Epistemological Beliefs	Effort	102	37.3235	6.46110	.246	-.439
	Ability	102	18.5784	5.13855	.857	.642
	Single Truth	102	25.3039	5.67047	-.193	.247
Emotional Intelligence	Perception	102	24.8431	3.27833	-.125	-.655
	Comprehension	102	23.5196	3.54527	-.490	-.215
	Management	102	30.8922	5.48789	-.853	.941

As seen in Table 1, the mean scores obtained from the sub-dimensions of the scales vary between 18.5 and 49.2. The skewness and kurtosis values for the obtained scores are between -1 and +1, indicating that there exists normal distribution for the sub-dimensions of the scales.

Univariate normal distribution does not always refer to the fact that multivariate normality was achieved. Therefore, for multivariate normality is presented in Figure 2.
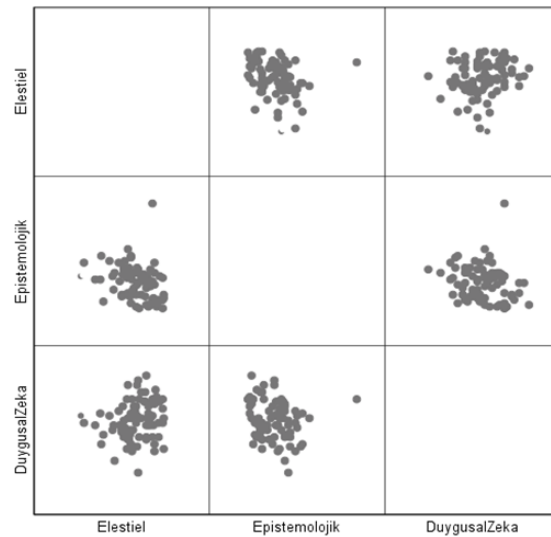
Figure 2. Multivariate normality

Figure 2 indicates that linearity slightly differed from normality. Such condition is considered acceptable based on the number of samples in the present study.

Similar or highly similar dimensions or scales mean that a variable is overused in research. The findings based on the multi correlation test are presented in Table 2.

Table 2: *B and Beta correlation coefficients and significance levels of the variables*

		B	Std. Error	*Beta*	t	p	Tolerance	VIF
1	Constant	103.049	16,201		6.361	.000		
	Truth seeking	-.369	.231	-.174	-1.593	.115	.763	1.311
	Open-mindedness	.117	.187	.072	.626	.533	.678	1.474
	Analyticity	.545	.260	.267	2.099	.039	.563	1.777
	Systematicity	.180	.323	.065	.558	.578	.674	1.484
	Confidence in reasoning	-.636	.253	-.291	-2.512	.014	.675	1.482
	Inquisitiveness	-.298	.292	-.128	-1.020	.310	.572	1.749
	Perception	-.616	.352	-.177	-1.750	.043	.887	1.128
	Comprehension	.049	.356	.015	.138	.891	.739	1.354
	Management	-.013	.237	-.006	-.056	.955	.697	1.435

Given that the obtained variance inflation factors (VIF) are less than the critical value of 10 and the tolerance values are higher than 0.20, it is concluded that there exists no multi correlation problems between the independent variables, hence the analysis process is initiated. The analysis process focusing on testing the significance of the research model, which measures the extent that Emotional Intelligence Scale and California Critical Thinking Disposition Inventory predict the Epistemological Beliefs Questionnaire scores of the students. The findings are presented in Table 3.

Table 3. *Regression results*

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2170.304	9	241.145	2.025	.045[b]
	Residual	10958.373	92	119.113		
	Total	13128.676	101			
$R = .407$; $R^2 = .165$; Improved $R^2 = .157$						

Based on ANOVA statistics, multiple linear regression analysis puts forward that the 9 independent variables in the standard model significantly predict the Epistemological beliefs score, which is the dependent variable [F(9-92). =2,025, p<.05]. Furthermore, multiple regression results indicate that 16% of variability in epistemological beliefs questionnaire is explained by factors in emotional intelligence and critical thinking scales.

However, not all sub-dimensions explain the Epistemological beliefs (Table 2). The sub-dimensions, "Analyticity" and "Confidence in reasoning," in the Critical Thinking Scale and the "Perception" sub-dimension in the Emotional Intelligence Scale are the sub-dimensions that significantly contribute to explaining the Epistemological beliefs. Even though other sub-dimension scores are not significant in predicting the epistemological beliefs, they are beneficial for estimations. The equation formulated due to the analysis results is as follows:

Epistemological beliefs = 103,049-0,369*Truth seeking + 0,117*Open- mindedness + 0.545*Analyticity + 0.180* Systematicity - 0.636* Confidence in reasoning - 0.298* Inquisitiveness - 0.616*Perception + 0.049*Comprehension - 0.013*Management

Based on the equation, it is understood that a 1-unit increase in "Analyticity" values in the critical thinking scale results with an increase in the epistemological belief of the individual by 0.545 units and such amount is found to be significant. Furthermore, it is observed that a 1-unit increase in "Confidence in reasoning" dimension of the Critical Thinking Scale may cause a significant decrease of 0.636 units in the epistemological beliefs of an individual. Additionally, a 1-unit increase in the Emotional Intelligence Scale sub-dimension, "Perception" may cause a significant decrease of 0.616 in the epistemological beliefs of an individual.

4. Discussion and Conclusion

As a result of the present study, conducted to investigate the effects of critical thinking skills and emotional intelligence on the epistemological beliefs of the students enrolled in the Child Development Program, it is found that individuals lose their beliefs on their accomplishment of a task due to increased perception and self-confidence.

Given that knowledge is perpetual, an individual cannot reach and know each piece of knowledge and grasp it completely. Therefore, there are specific areas of expertise that were developed in line with the interests and requirements of individuals. An individual intends to increase his/her knowledge a certain field or fields of expertise. The fact that information has no limits and the limited knowledge capacity of an individual render such objective unattainable.

Socrates suggested such an approach in his following statements: "The only thing I know is that I know nothing. The factual knowledge is to know that you know nothing." Such assertion completely coincides with the outcomes of the present research. Increased level of

education lets the individual realize how little he/she knows about plethora of issues. The individual, nevertheless, attains a broad knowledge on limited topics.

Contrary to the findings of the present study, Yılmaz Karabulutlu, Yılmaz and Yurttaş (2011) point out that problem-solving skills of university students increase as their emotional intelligence, determined at a mid-level, increase. The present study has revealed that an increase in the "perception" sub-dimension, one of the six dimensions of emotional intelligence, the "effort" sub-dimension in epistemological beliefs decreased.

Similarly, Özözen Danacı and Pınarcık's study (2017) shows that individuals with advanced epistemological beliefs have same levels of increase in problem-solving skills and strength. In the present study, it has been determined that increased self-confidence of an individual resulted with decreased efforts in accomplishing a task.

Akgün and Gülmez (2015) report that diverse levels of epistemological beliefs identify in high school students has no significant effect on their academic achievement. Such outcome supports the findings of the present study. It is possible to state that even though the individuals are aware of the means to acquire accurate knowledge, they fail to succeed through the use of such knowledge.

The findings of the present study have exhibited similarities with the studies of Akgün and Gülmez (2015) yet contradict with the findings of Aydın and Geçici (2017). Aydın and Geçici argue that the level of general academic achievement decisively influences the epistemological beliefs of students, with respect to the source and validation of knowledge.

States continue their existence due to the cultivation of the beneficial individuals. Schools attempt to lead individuals to higher education institutions, to life and aim to bring up the productive human model required by the states. Therefore, education programs should be structured in a way as to raise productive individuals who contemplate, question, empathize, struggle, and that are not daunted under any circumstances.

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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INTRODUCING A NEW DATA COLLECTION TOOL IN EDUCATION: THE STORAGE TECHNIQUE

Research article

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INTRODUCING A NEW DATA COLLECTION TOOL IN EDUCATION: THE STORAGE TECHNIQUE

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Abstract

The purpose of this qualitative study, based on the Survey Method, was to introduce a new technique to collect data on educational practices. For this purpose, a sample practice was designed to implement with a volunteer study group comprising 36 editors in a publishing company. The task details of the sample practice were determined via DACUM (Developing a Curriculum) method in order to analyze the tasks and the job description of editors in a publishing company. In that way, thirteen tasks were determined for the participant editors. During the implementation phase of the new technique called "Storage Technique", a sheet of colorful paper was delivered to each participant, they were invited to think and write down whatever came uppermost as a task of an editor, and to fold the paper. The papers folded were put in to a fishbowl. After all participants put their folded papers in the bowl, they were invited to pick a paper in the color other than theirs, and to write the task written in that paper if it was different from their own. The process was repeated for three rounds, and consequently, three different task descriptions were obtained from each participant editor. Finally, 7 out of 36 participants were interviewed to get their viewpoints about the technique administered in the process. For the analysis of the data, the descriptive analysis was utilized. The result of the study revealed that the Storage Technique could be applied effectively for the collection of the data in the fields of Education and Teaching.

Key words: DACUM method, data collection, editors in publishing companies, tasks of editors, Storage Technique, Education and teaching

1. Introduction

Since the early history of humanity, man has been in an effort to make sense out of the world and environment surrounding him and his life. The effort to understand existence and make sense of life has shaped the adventure of mankind on earth. In an effort to facilitate life on earth and to make sense of the past and the future, the human being has always strived to learn and gain knowledge. As a result of this effort, accumulation of scientific knowledge has always continued increasingly. Efforts to increase the accumulation of scientific knowledge have developed the researches of human being to obtain new information, methods and products over time. The fact that the researches gain a scientific dimension with the developing information, methods and products revealed the concept of scientific research and provided more systematic responses to the feeling of curiosity. For this reason, the concept of scientific research is qualified as an effort to produce or compile information that includes a specific purpose, steps and method to obtain new information, methods or products (MEGEP, 2006).

A scientific research can be conducted for developing a new method in addition to the purposes such as bringing innovation to science, finding a solution to a problem, applying a known method to a different area or determining an existing situation (Er, 2011; Kaya & Şahin, 2014; Resmi Gazete, 2016). The increase in scientific researches in order to develop a new method can be seen as valuable because of adding diversity and variety of methods to science.

The way to produce science is by obtaining provable information using scientific processes. The use of methods and processes that are believed to contribute science will be possible through scientific means and scientific research process (Erişti, Kuzu, Yurdagül, Akbulut & Kurt, 2013). Developments in scientific research process, methods and techniques have led to the development of different ways for different problems and contributed to the rapid increase of knowledge. Since the use of a new data collection technique that has never been used before will not show that this new data collection technique is scientific, the scientific research process should also be employed for this new data collection technique. In this research study, the quality of the storage technique, which is a data collection method that has never been used before, is aimed to be revealed.

Studies focused on groups have been used by sociologists and psychologists for more than half a century (Merton & Kendall, 1946; Merton, Fiske & Kendall 1956). In fact, group works, in their simplest form, are the works that sharing of ideas is carried out among selected people on certain topics. Although there are many possible variations on the basic method (Kitzinger 1990, Krueger 1998), it involves one or more group discussions where the participants are collectively focused to a topic chosen by the researcher. Participants (usually 6-8 and rarely more than 12) can be pre-existing groups of people (for example, family members, colleagues) or can be drawn specifically for research. In this case, groups are generally homogeneous in relation to 'status' factors such as occupation, social class or age (Carey, 1994). The data analysis sections of group work manuals are often very short, and most commentators suggest that appropriate techniques for analyzing one-to-one interview data are equally valid for use with focus group data. Many researchers make one-on-one interviews and focus group data alternately (Wilkinson, 1998).

Focus groups are used in three main ways. They were first used as a part of multi-method research design in addition to other methods. Second, perhaps most commonly used as a primary research method to conduct phenomenological research on people's own views and understandings. Third, it was used as a kind of participatory action research to empower participants and promote social and political change (Wilkinson, 1998).

In the implementation of the Storage Technique, which can also be used as an active learning technique, it is aimed to ensure the interaction of the participants to share the experiences. A fishbowl and four, five or six different colors of paper are required to apply this technique. The implementation stages of the Storage Technique can be stated as follows respectively:

- Participants are informed about the purpose and application stages of the technique.
- Papers in different colors are delivered to each participant.
- Each participant is invited to write down the first important task of an editor that comes to their mind on the paper in front of them. This practice can also be repeated as a teaching technique in the learning-teaching process by writing their most important achievement at the end of a lesson.

- After the writing process is completed, the participants are invited to fold the papers and throw them into the fishbowl (storage) in front of them. While doing this application, the participants are told to keep in mind the color of their own paper.
- Then, while the fishbowl (storage) is circulated again in the group, each participant is reminded to pull a folded piece of paper from the fishbowl (storage) other than the color of their own paper.
- Each participant is asked to unfold the paper and read what is written on it, and to write the third important information he/she deems important apart from this paper and what he/she has written first, then to re-fold the paper.
- The fishbowl (storage) is circulated again in the group and the papers that are written and folded are thrown into it.
- The fishbowl (storage) is re-circulated in the group and the participants are asked to pull out a paper in a color other than the colors of the papers they wrote in the previous two rounds, and read two items written, then to write another information that they consider important other than the two information they read and the two information they wrote.
- Later, the fishbowl (storage) is circulated again and all the papers are thrown into it.
- All papers are pulled out one by one from the storage and read in a way that the whole group can hear, and each item is discussed and evaluated one by one.
- Eventually, all of the information collected in the fishbowl (storage) is combined and the common product of the group is created.

1.1. Problem

Cultural, social, economic, technologic changes in life requires a global approach in the education system of every country. As a consequence, these changes and the needs for a global approach to education require deeper and wider researches in education to discover or to evaluate the new ways of practices in education. Collecting data is one of the most important stages of scientific researches because all the findings, discussions and conclusion are based on the data collected and the analysis of the collected data. At this point, each and every functional method or technique to collect the data is appreciated by researchers.

In this study, it was assumed that the technique, named Storage Technique, was considered to be a new and effective implementation to collect data in studies related to Education and teaching. Based on this assumption, the research question of the study was formulated as in the following:

What are the viewpoints of the editors of publishing companies about the "Storage Technique" after the implementations of writing down the tasks of an editor?"

2. Purpose

The purpose of the research is to examine, observe and evaluate the effectiveness of the "Storage Technique" implementation as a data collection tool conducted with participant editors of a publishing company in the meeting held regarding the "Editor's Job Description" .

3. Method

3.1. Research Model

The research was based on the Survey Method via an interview and utilizing the qualitative analysis techniques.

3.2. Participants

The participants of the research consisted of 36 editors who participated in the meeting held with the aim of determining the job description and professional standards of editors in publishing companies.

3.3. Data collection

The meetings with the editors were conducted mutually and one-to-one basis by the researcher. The interviews were first recorded with a voice recorder, and then these recordings were transcribed and converted into a written form. Themes were created via classifying the recorded data using the qualitative research method.

There were a total of number of 4 questions in the interview form addressing to the participant editors. The questions were as follows:

Question 1: How did you find the "Technique" in terms of the objectives and content of the meeting about "Editor's Job Description"?

Question 2: What are your opinions about the impressions in the setting of the "Storage Technique" about determination of editor's job description?

Question 3: How did you find the "Storage Technique" and the meeting in terms of evaluation dimension?

Question 4: What are your opinions and suggestions about "Storage Technique" and its application process?

3.3. Data analysis

Descriptive analysis, one of the qualitative research data analysis methods, was used to analyze the data obtained.

Descriptive analysis: According to this method, the data are summarized and interpreted according to the previously determined themes. In the descriptive analysis, direct quotations are often included to reflect the views of the individuals interviewed or observed. In such analyzes, the aim is to present the findings to the reader in an organized and interpreted manner. The data obtained for this purpose are first described systematically and clearly. Later, these descriptions are explained, interpreted, cause-effect relationships are examined and some conclusions are reached. Associating, interpreting and making forward predictions of the emerging themes may also be among the dimensions of the researcher's comments (Yıldırım & Şimşek, 2008: 224).

After the data obtained in the interview process of the research were evaluated in line with the explanations given above, themes related to the purpose of the research were created as follows:

- Storage technique from the perspective of the editors
- Likes in the creation of the editor's job description using the storage technique
- Criticized aspects in the creation of the editor's job description using the storage technique

- Likes of editors about the final draft of the document containing the editor's job description after the meeting

- Criticism from editors about the final draft of the document containing the editor's job description after the meeting

- Suggestions of editors about the application process

Findings were interpreted according to the themes created. All of the data obtained by data collection were placed in the tables and those tables are used while making interpretations.

4. Findings and Discussion

4.1. Interviews with participants about the storage technique

As a result of the interviews with the editors, the sound recordings were transcribed and transferred to the written form, and the opinions of the editors were examined. Seven of the participant editors were interviewed face-to-face to create the 6 themes identified, and an average interview was carried out in 312 seconds (about 5 minutes and 20 seconds). The interview periods for each of the 7 interviews are given in Table 1.

Table 1. *Interview periods with the participants*

Interviews	Interview 1	Interview 2	Interview 3	Interview 4	Interview 5	Interview 6	Interview 7
Period (Seconds)	300	244	313	302	418	237	371

4.2. Theme 1: Storage technique from the perspective of the editors

The responses of the editorial staff to the question of how they found the storage technique used in the editor's job description were themed and coded as indicated in Table 2.

Table 2. *Storage technique from the perspective of the editors*

Themes, Codes and Sub-Codes	N	Opinions
Storage technique from the perspective of the editors	5	Storage technique was a technique that I first encountered.
- Data Collection Tool	4	It was fun.
- Likes in terms of time and usage	3	It was in an order that everyone could easily express their opinions.
	3	It was a useful application.
	2	It wasn't very long; it was very nice in this sense.
	1	Storage technique was successful.
	1	It was interesting.
	1	I think it was an important and good technique for gathering information.

More than half of the editorial staff interviewed stated that they encountered the storage technique for the first time. More than 50% also stated that this technique is a very fun application. When Table 2 is examined, almost half of the interviewed respondents evaluated the application of the storage technique as an application that everyone can easily communicate. Nearly half of the interviewees stated that the application is useful. It is also an important finding that there are participants who think that storage technique is quite pleasant in terms of short duration.

While one participant found the storage technique successful, another participant found it interesting. In addition, another participant stated that it is a good technique for gathering information. In general, when Table 2 is examined, it is seen that there are ideas that the storage technique is evaluated in terms of data collection tool and the likes about the technique are expressed.

4.3. Theme 2: Likes in the creation of the editor's job description using the storage technique

At the end of the coding and theming process of the content analysis performed on the data obtained as a result of the interviews, the theme of "likes in the creation of the editor's job description using the storage technique" was created. Findings and comments obtained in the light of this theme are given in Table 3.

Table 3. *Likes in the creation of the editor's job description using the storage technique*

Themes, Codes and Sub-Codes	N	Opinions
Likes in the creation of the editor's job description using the storage technique	5	It was a very democratic attitude to have editors' job description determined by editors.
- Quality of the technique - Quality of the information	4	It was a developing (useful) activity.
	1	I think it was extremely creative.
	1	I have clearly seen that such a technique is a useful technique in defining the tasks of the editor, in terms of uncovering the right things.

Table 3 shows the likes of interviewed editorial staff regarding the application of the storage technique applied to make the job descriptions of the editors. More than half of the respondents (71.43%) find it very democratic for the editors to make editor's job description by themselves. One participant expressed his opinion as follows:

Interviewee 1: "...The resulting product was everyone's thoughts and I found it successful".

Interviewee 2: "The most important aspect of the technique is that everyone's common idea is created".

In addition to these opinions, another participant's opinion, who stated that he did not meet his expectation but found the technique useful in a similar way, is as follows:

Interviewee 3: "If we question its usefulness, it did not meet my expectation, but it is useful for people to express their opinions.

In addition, more than half (57.15%) of the interviewed participants defined the storage technique as a developer during the job description process. In this sense, a participant stated his opinion as follows:

Interviewee 1: "I had a frame before the meeting. At least I felt that I had to improve this framework, even I would improve continuously".

One participant found the technique creative when he evaluated it in terms of the task definition, while another participant described it as a useful technique. The participant, who described it as useful, described this benefit in terms of more accurate definition and determination of the tasks of the editors.

4.4. Theme 3: Criticized aspects in the creation of the editor's job description using the storage technique

At the end of the coding and theming process of the content analysis performed on the data obtained as a result of the interviews, the theme of "criticized aspects in the creation of the editor's job description using the storage technique" was created. Findings and comments obtained in the light of this theme are given in Table 4.

Table 4. *Criticized aspects in the creation of the editor's job description using the storage technique*

Themes, Codes and Sub-Codes	N	Opinions
Criticized aspects in the creation of the editor's job description using the storage technique - Job Description - Evaluation according to the purpose	1	I think it did not reach the goal in terms of my expectations.
	1	There is a situation like assigning duties to the editor.
	1	At the end of the meeting, an evaluation was made by reading the papers on which everyone wrote their opinions. It was as if it was only read, a full evaluation was not made. Then a form comprised of a list was sent to us.

While the likes in the creation of the editor's job description using the storage technique, the opinions of the individuals who expressed their criticisms about the application were arranged in Table 4. In this sense, when Table 4 is examined, different criticisms have been expressed by one person and a general criticism of 43% has been realized.

The interviewee, who mentioned his expectation in Table 3, also expressed this here. He stated that he had an existing expectation before entering the meeting and that this expectation could not be met because he could not reach his goal. Another participant stated that a situation such as assigning duties to the editor instead of a job description occurred in the

meeting. Another participant stated that the evaluations made at the end of the storage technique application process are not complete.

Determining the task description and presenting these tasks to the participants in a list which is the purpose of this application were regarded to be a negative situation by an interviewee. It can be said that this situation aroused from the fact that the statements made to all participants before starting the application were not sufficient.

4.5. Theme 4: Likes of editors about the final draft of the document containing the editor's job description after the meeting

After the meeting and the storage technique applied, the job description of the editors was determined by the authorized persons and a document containing the job description of the editors was prepared and distributed to the editorial unit. Thus, editors were informed. This was also addressed in the interview held with the editorial staff, and the opinions of the participants regarding this assessment and the document were interviewed, and the likes of the participants were compiled in Table 5.

Table 5. *Likes of editors about the final draft of the document containing the editor's job description after the meeting*

Themes, Codes and Sub-Codes	N	Opinions
Likes of editors about the final draft of the document containing the editor's job description after the meeting	3	It was a good, proper evaluation.
	1	I found it creative

Almost half of the participants who participated in the interview after the meeting regarding the job description of editors found the evaluation appropriate and good, while another person described it as creative. The opinions of a participant who found the application good are as follows:

Interviewee 1: "I did not expect it to be in such a short time. It seems that it has been carefully read, evaluated, studied. This is a very effective method. It is pretty good to do this way."

On the other hand, the person who qualifies the assessment as creative has conveyed the rationale for this quality as follows:

Interviewee 2: "I found it creative. I learned what I should not do. I learned to take what should be a burden on me and throw extra loads".

4.6. Theme 5: Criticism from editors about the final draft of the document containing the editor's job description after the meeting

At the end of the coding and theming process of the content analysis performed on the data obtained as a result of the interviews, the theme of "criticism from editors about the final draft of the document containing the editor's job description after the meeting" was created. Findings and comments obtained in the light of this theme are given in Table 6.

Table 6. *Criticism from editors about the final draft of the document containing the editor's job description after the meeting*

Themes, Codes and Sub-Codes	N	Opinions
Criticism from editors about the final draft of the document containing the editor's job description after the meeting - Single definition - Final decision mechanism - Time constraint	1	The ones discussed in general are reflected in the form. But I think there must be a single definition filtered from all opinions.
	1	I do not know how the opinions there (in the document) are determined. What are the opinions in the documents determined according to? Is there a voting done? Or did the management decide this? I do not know.
	1	I don't think it's enough to make a final decision.
	1	It was very nice. The following aspect may have been overlooked: At first they were all read (all of the ideas written on papers). But then, in terms of time, we are told "If there are similar things, skip them".

In Table 6, there are the points criticized by the interviewed participants regarding the evaluation process of the document in which the editor job descriptions are made. Since the criticisms are different from each other, the exact views of the individuals are presented in the table.

While one participant argued that many definitions were made, but only one definition including these items could be made; another participant criticized the decision mechanism of these definitions and questioned whether the decision was made by voting. He also questioned whether the management decided the final draft of the document. Yet another participant expressed his opinion based on the decision mechanism and stated that the evaluation was not a final decision. Another participant criticized that similar views were omitted in the document.

4.7. Theme 6: Suggestions of editors about the application process

At the end of the coding and theming process of the content analysis performed on the data obtained as a result of the interviews, the theme of "suggestions of editors about the application process" was created. Findings and comments obtained in the light of this theme are given in Table 7.

Table 7. *Suggestions of editors about the application process*

Themes, Codes and Sub-Codes	N	Opinions
Suggestions of editors about the application process - Continuity - Duration of application - The relationship of job	1	In order to better meet my expectations and to achieve the purpose of the applied storage technique, the editorial profession can be evaluated by comparing it with the editorial definitions previously done in other jobs.

description and participant - Making more useful applications - Adding different techniques to the process	1	I think, in order for the storage technique to be applied more comfortably, it would be more useful to have the application managed by any experienced person among us other than by the management.
	1	Actually, I do not have much technical advice, but the application could be more systematic. For example, the type of paper used in the application could be more diverse.
	1	In the application, there were some people who had other job descriptions like compiler, assistant editor ... They had no effect there. There could be only editors.
	1	Not all ideas were written on the board. If all ideas were written, it could be more productive for everyone to see. But that would be a waste of time too. Actually there was no problem in terms of time; the technique could be fully applied.
	1	By taking suggestions and criticism, the technique will be more developed.
	1	The storage technique should be explained a little more and I think that such meetings should be applied to the groups again from time to time without interruption.
	1	It should be continued. It should be repeated and if there are more advanced techniques suitable for our academy and they might be more useful, I would like them to be taught to us too.
	1	The application should be continued. I think it's useful. This technique can be applied very well in line with the application of quality circles. It can also have a very positive effect on solving problems in this way.
	1	This technique can also be useful in many different areas beyond the topic. This can be used in every area that the people have difficulties in definitions or how they can take it further. This technique can be an important tool for our everyday discussions such as "What is the teacher? What is success? What is promotion?" I think it has a creative contribution.

In Table 7, the suggestions of the editorial staff regarding the implementation process have been presented. When Table 7 is examined, it is seen that the views are mostly related to the continuity of the implementation process. According to this finding, it can be said that the participants found the application effective. In addition, as stated in the sub-codes, suggestions were made regarding the duration of the application, the implementation of the application more accurately and the use of different techniques in such processes, and that the participants should be persons related to the subject of the meeting.

5. Results and Suggestions

5.1. Results

Based on the findings of the study, the results of the research are as follows:

- Storage technique can be seen as an appropriate technique for data collection and teaching and generally positive thoughts about the application have been conveyed. It is also understood from the views that the meetings have become more fun with such activities. Such practices keep employees away from the boring and monotonous meeting atmospheres; it enables them to be more efficient and to be more sensitive. It is determined that the storage technique, which is thought to be very useful, can be used not only in such definitions but also in other internal decisions and applications.
- It has been determined that the storage technique is a creative information gathering application that the participants enjoy and participate in by having fun and also provides personal development. It was clearly seen that decision-making processes based on stakeholder opinions were perceived as a positive and appropriate practice by the editors.
- It can be assumed that the storage technique is an interesting, beneficial and democratic application completed in a short time in which participants can easily convey their opinions. It is determined that it is a new and unknown application and therefore the steps should be explained in detail before starting the application. Only one of the 7 editors interviewed stated that this technique is a new technique, while the rest of the group stated that they did not know anything about it. Thus, if this new technique is to be used for any reason, providing more detailed information about this technique to the audience will eliminate anxiety.
- Carrying out a process evaluation by taking the opinions of everyone at the meeting can be positively received by the editors. If the required time were not allocated to the evaluation made at the end of the application, it was found that the responsibility of the participants in the decision-making process decreased. The editorial document created by evaluating the meeting was delivered to the editors, and there are positive and negative opinions about this document. Negative opinions about the document containing the job descriptions of the editors should not be ignored.
- It has been determined that adopting an authoritarian management style in the application process was found disturbing by the participants.

5.2. Suggestions

Following suggestions were made to researchers and practitioners based on the findings and results of the study:

- Storage technique can be used in data collection and teaching, especially when it is desired to get away from a boring meeting atmosphere, to create a fun environment and when time

is limited. Storage technique can be used not only in job descriptions, but also in other institutional decisions and teaching practices.

- Storage technique can be used when it is requested to take responsibility for decision-making and the participation of stakeholders, participants or learners is required.
- The evaluation process in the application of storage technique can be more effective by allocating enough time required. Paying attention to stakeholder views in the decision-making processes regarding the editorial units will be a more appropriate attitude in trying to finalize the decisions and making the decisions to be seen appropriate and acceptable by the relevant unit.
- Since it is a new and unknown application, a detailed description and a written instruction can be provided before starting the application.
- Instead of being managed by an authoritarian form of management or an individual representing authority, the attitudes and behaviors that make the participants feel more comfortable can be adopted during the implementation process. In addition, care can be taken that the person who conducts the meeting is not a senior manager or a person representing authority.
- In the application process, the color of the papers on which the opinions are written can be increased.
- A similar qualitative research can be carried out on the application of the storage technique in active learning.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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AN ANALYSIS OF THE EFFECT OF PEER AND TEACHER FEEDBACK ON EFL LEARNERS' ORAL PERFORMANCES AND SPEAKING SELF-EFFICACY LEVELS

Research article

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Abstract

This quasi-experimental study aims to determine EFL learners' speaking self-efficacy levels and to examine the changes in oral performances after receiving feedback in three module courses. The relationship between speaking self-efficacy and oral performances after receiving feedback was also studied. Quantitative method was applied in this study. The study was conducted among thirty-three EFL prep-school participants in a state university in Turkey. The research began with the implementation of a speaking self-efficacy scale (pre-test) and a speaking test. This process was followed by three oral treatments following teacher and peer feedback and the same speaking test. Repeated treatments and the same speaking test were conducted in the other two modules, as well as a final speaking self-efficacy scale (post-test). The results of the speaking self-efficacy scale revealed that students generally possess high speaking self-efficacy level. The findings also showed that students demonstrated significant changes in their oral performances following feedback treatment in both groups. In the final speaking test, participants who received teacher and peer feedback improved by 212.36% and 161.20% respectively compared to the first speaking test. However, no significant correlation between the two variables was observed. This may suggest that the sample size was insufficient to observe such a relationship.

Keywords: peer feedback, teacher feedback, oral performances, speaking self-efficacy

1. Introduction

Speaking is a crucial skill in learning English as a foreign language as well as an essential skill for communicating with people in daily life. At the same time, speaking commonly has been viewed as "the most demanding of the four skills" (Bailey & Savage, 1994, p.7). In Turkish EFL classrooms, learners generally cannot speak well due to speaking anxiety and low self-efficacy (Gürsoy & Karaca, 2018).

Self-efficacy has been a crucial factor that assisting or hindering language learning progress as well as learners' preferences for certain learning activities (Bandura, 1977, 1986, 1997; Pajares, 1996; Zimmerman, 2000). In other words, self-efficacy may be regarded as a consistent predictor of students' motivation and learning strategies. For instance, learners with a higher sense of self-efficacy are more likely to achieve their goals while avoiding negative emotions after making mistakes (Yanar & Bümen, 2012). Without adequate self-efficacy, learners may not be able to attempt more challenging tasks and demonstrate their abilities. Moreover, a higher sense of self-efficacy may lead to increased motivation, which

aids students in focusing on their learning tasks, performing better, and ultimately achieving their learning goals.

In addition to self-efficacy, another factor affecting oral performance is feedback. Feedback refers to information provided by an agent such as teacher, peer, or oneself regarding the aspects of one's performance or understanding (Hattie & Timperley, 2007). It plays an important function in learner output in that it may be viewed as a result of a performance (Sheppard, Flexer, Hiebert, Marion, Mayfield & Weston, 1996). Thus, feedback may significantly impact the processes of learning and achievement (Hattie & Timperley, 2007). Moreover, based on its instructional purpose, feedback should provide information specifically related to a given task or process which fills the gap between what is understood and what is aimed to be understood (Sadler, 1989). Feedback is also given in response to learners' errors, and these learners may accept, modify, or even reject the feedback. Moreover, feedback may enhance learners' sense of self-efficacy by enabling them to self-reflect and concentrate on their peers' judgment of their language capabilities. In particular, positive judgment, praises, and feedback affect the way learners evaluate themselves. It also enhances learners' willingness to learn and their self-confidence, and thus their learning motivation (Yang & Wu, 2013). In other words, accepting feedback can be viewed as the most effective factors in enhancing self-efficacy and achievement (Yang & Wu, 2013).

2. Literature Review

2.1. Self-Efficacy

Many studies have examined learners' beliefs, also known as self-efficacy (Bandura, 1977, 1986, 1997; Pengajaran, 2018; Zimmerman, 2000). Bandura (1977) introduced the idea of self-efficacy as a key element in learners' success. Self-efficacy was defined as a person's beliefs concerning his or her completion of a task and his or her competency level in performing the task (Bandura, 1977). In other words, self-efficacy concerns how learners think about their capabilities to organize and complete a learning task to reach a goal (Zimmerman, 2000). Self-efficacy beliefs are an important aspect of human motivation and behavior, and they directly influence certain actions (Pengajaran, 2018). It also focuses on performance capabilities rather than on personal qualities. Bandura (1977) also suggested that self-efficacious students are usually more hard-working and engage more readily and persistently throughout the learning process. Unlike inefficacious students, self-efficacious students do not doubt their abilities and have more stable emotional reactions when they encounter difficulties (Zimmerman, 2000). That is, individuals who accomplish tasks successfully usually have higher self-efficacy (Ocak & Olur, 2018). Those who have a lower sense of self-efficacy for accomplishing a task may avoid it, while those who believe they are capable often participate readily (Schunk, 1991). Finally, in terms of choosing activities, self-efficacious students usually prefer more challenging tasks.

2.2. Speaking Self-Efficacy and Language Learning

Despite the significance of self-efficacy to the learning process, only few have investigated its relationship to students' speaking ability (Alawiyah, 2018; Asakereh & Dehghannezland, 2015; Dasmo & Sundari, 2014; Liu, 2013).

One researcher who has investigated this relationship is Liu (2013), who assessed the impact of an "English Bar" on college students' speaking self-efficacy. The results demonstrated that students who had often spoken English at the bar possessed higher levels of self-efficacy than those who had rarely or never visited the bar. He also observed four positive effects of speaking English at the bar: (1) students were free to choose their partners to reduce their anxiety level, (2) students with inadequate speaking skills were motivated by

foreign teachers and their partners, (3) students' self-efficacy was enhanced while they observed "similar others" who were proficient speakers, and (4) students worked harder as they realized that they were making some improvement in English.

In another study concerning speaking skills achievement as it relates to speaking self-efficacy is Asakereh and Dehghannezland (2015). Asakereh and Dehghannezland (2015) investigated the relationship among student satisfaction with speaking classes, speaking self-efficacy beliefs, and speaking skills achievement. The results showed a significant positive correlation among the variables and that students with higher speaking self-efficacy were more likely to achieve higher scores in speaking skills.

In a slightly different context, Alawiyah (2018) examined the relationship between speaking self-efficacy and EFL student-teachers' speaking achievement. The results demonstrated that student-teachers' self-efficacy levels significantly influenced their speaking achievement.

2.3. Feedback

Learners should regularly compare their learning progress with their learning goals in order to develop their linguistic knowledge (Zarei, 2018). Thus, evaluation is essential to any learning and teaching process. Feedback is one of the common classroom evaluation, and there are different forms of instructional feedback for evaluating the knowledge, skills, and performances of learners. Teacher feedback, peer feedback, and self-evaluation are some examples. Evaluation aids learners in identifying their strengths and weaknesses, ultimately enhancing their achievement by highlighting progress rather than deficiency (Zarei, 2018). Moreover, in regard to feedback in speaking, speaking is a highly subjective activity, and the administration of speaking feedback is particularly difficult. Feedback is usually given immediately following the presentation by the teacher and or peers. Afterward, during the feedback process, students may revise their presentation based on the input they have received from their teacher and or peers.

The significance of conducting research on feedback and evaluation in speaking is that it may increase both teachers' and learners' awareness of effective speaking criteria, improve learners' speaking ability by enabling them to self-reflect on their performance, and foster more positive attitudes towards speaking.

According to Marzano, Pickering, and Pollock (2001, p.187), effective feedback should adhere to the following set of criteria:

1. It should provide students with some explanation of why their productions are correct or incorrect.
2. It should be given immediately.
3. It should be specific to a set of criteria.
4. It should involve students in providing their own feedback based on feedback given by the teacher.
5. It should enable students to learn from their mistakes, make necessary changes, and achieve higher levels of performance.

2.4. Feedback on Speaking Performance

A limited number of studies regarding feedback in an EFL setting have aimed to determine whether certain feedback types are more or less effective in improving students' speaking performance (Lynch & Maclean, 2003; Smith & King, 2004).

One research that has examined the impact of feedback on the oral performance of English for special purposes students is that of Lynch and Maclean (2003). Their study was conducted in the Netherlands among a group of advanced students and involved a 20-minute speaking cycle. Students received tutors' feedback on their spoken performance in written form and on an individual basis. The results indicated improvement in oral performances that had received feedback highlighting students' weaknesses. The result is surprising, as students were aware of their language problems identified in teacher feedback as well as problems not identified in feedback. The most striking result was that students were aware of changes in their language use.

Another investigation that has examined students' feedback sensitivity and the efficacy of feedback interventions is that of Smith & King (2004). The results indicated that students with higher sensitivity towards feedback have better speaking behaviours. In particular, feedback was made in low intensity with less direct, personal way of criticism.

2.5. Teacher versus Peer Feedback in the Domain of Speaking

Despite teacher and peer feedback are commonly studied, there is a significant lack of research comparing the effects of teacher and peer feedback on students' speaking performance, both internationally and in a Turkish setting. Only one study has compared these feedback types in the domain of speaking (Murillo-Zamorano & Montanero, 2017).

Murillo-Zamorano & Montanero's study (2017), which involved thirty-two Economics and Business students in a Spanish university, has compared the impact of peer and teacher feedback on the oral presentation. The research tested whether oral presentation skills, with some support instruments such as videos and rubrics, provided improved following teacher and peer feedback. The results indicated that the peer feedback group had more improvement than that of the teacher feedback group in the post-test. Based on the findings, the results suggested that peer assessment could be somehow effective in enhancing oral presentation skills. However, the improvements were not maintained in the peer feedback group in the follow-up re-test. The results implied that a single session of peer feedback with rubric might not be sufficient enough to generalize any improvements in the said competency.

As mentioned above, there has been a lack of research comparing teacher and peer feedback on speaking in international EFL context as well as in Turkey. The most striking fact is that the above study is the only one which compares two feedback types in speaking; moreover, it was not in EFL context. Hence, it is necessary for further research at this level. This necessity motivated the research of the present study, which investigated the effects of teacher and peer feedback regarding to speaking. More specifically, this study aimed to answer the following research questions:

1. Are there any changes in the level of students in speaking self-efficacy?

2. Is there a statistically significant difference in terms of oral performances after treatment?

3. Is there a correlation between speaking self-efficacy level and oral performance following feedback?

3.Methods

3.1. Research Design

This quasi-experimental study employed a repeated measures design involving pre-test, treatment, and post-test of speaking performance as well as a speaking self-efficacy scale. In this way, the design utilized a quantitative approach. The duration was twenty-four weeks and spanned the course of three academic modules within the preparatory program (A1 Elementary, A2 Pre-Intermediate, and B1 Intermediate modules).

For the repeated treatments, two treatment conditions were established: (1) peer feedback with TOEFL independent speaking rubric and, (2) immediate teacher feedback with the use of TOEFL independent speaking rubric. All of the oral presentations were conducted under these conditions. Participants were divided into two groups: Group A (peer feedback) and Group B (teacher feedback). Each student from Group A received peer feedback, while each student from Group B received immediate teacher feedback. A comparison was made based on the two types of feedback in terms of the content and performances of students' pre-test and post-test assessments.

3.2. Participants

For participant selection, a convenience sampling method was used. A1 students were selected as they typically are insufficient in speaking ability and can better demonstrate improvement in speaking tasks over a certain period of time. During the A1 module, Group A was comprised of sixteen (66.67%) males and eight (33.33%) females, while Group B consisted of seventeen (70.83%) males and seven (29.17%) females. By the end of the A1 module, six students from Group A and five students from Group B had dropped out or failed to pass to the A2 level. During the A2 module, the study continued with eighteen participants in Group A and nineteen participants in Group B. By the end of the A2 module, three students from Group A failed to pass to the B1 level. During the B1 module, the study continues with fifteen students from Group A and nineteen students from Group B. By the end of the B1 module, only one student from Group B quit the study due to the sickness.

3.3. Data Collection

1. Foreign Language Speaking Self-Efficacy Scale

A five-point Likert scale was taken from the article, "The Scale Development Study on Foreign Language Speaking Self-Efficacy Perception" by Ocak and Olur (2018) (Appendix A & B). Only 24 items remained, and these were grouped according to three factors. The Cronbach's Alpha value was found to be .944 in the study of Ocak and Olur (2018), which indicated the internal consistency of the scale. While in this study, the Cronbachs's Alpha value was found to be. 943 in the pre-test and .944 in the post test.

2. Speaking Test with TOEFL Independent Speaking Rubric

It was used to determine the improvement of speaking proficiency in different modules. The speaking test was designed by the researcher based on the syllabus of the School of Foreign Languages. The participants were asked to talk about a holiday that they have taken recently or sometime in the past. The same speaking test was conducted four times at the beginning of A1, at the end of A1, A2 and B1 module. Participants' responses were evaluated according to the criteria for independent items listed on the TOEFL independent speaking rubric (Appendix C). It employed a four-point analytical scale, and the scores were derived from evaluators' holistic considerations of a general description based on three dimensions: delivery, language use, and topic development (ETS, 2008). For each category, score bands

and a set of descriptors of student performance were listed and could be used systematically to assign scores to an individual student's performance. In this study, in order to gain a clear understanding of students' improvement, four points were assigned within each category, producing a total of twelve points. In addition, the average of two instructors' scores functioned as the final grade.

3.4. Procedure

This research was conducted for approximately twenty-four weeks during the first three modules of the 2018-2019 Academic Year. Prior to the study's commencement, the consent of both the departmental administration and students was obtained (Appendix D & E). Before obtaining this consent, students were made aware of the study's purpose, structure, and duration as well as its evaluation methods regarding oral presentation and preparation for giving the presentation. Moreover, participants in Group A were enlightened regarding the use of the analytical speaking rubric for evaluating their peers' speaking performance throughout the term.

The following steps were involved in data collection:

Step 1: Administration of the foreign language speaking self-efficacy scale (Pre-test)

A foreign language speaking self-efficacy scale (pre-test) was administered on September 27th, 2018, to determine students' levels of self-efficacy toward speaking in English within the department.

Step 2: Administration of the first speaking test

Participants in both groups undertook the first speaking test on October 3rd, 2018, to demonstrate their oral performances. The oral performances were rated based on three dimensions: delivery, topic development and language use of TOEFL Independent Speaking Rubric. Two raters individually assessed the participants' performance and the average of their two scores was considered as the final grade. In addition, prior to the treatments, participants from Group A received a training session regarding peer feedback method for a week. The participants from peer feedback group listened to five responses of the same TOEFL independent speaking task and then compare their rating to the TOEFL speaking grading report.

Step 3: Administration of the first treatment (Oral Presentation) in the A1 Module

Following the training session for Group A, both groups gave oral presentations on October 11th, 2018. Each student gave a short presentation lasting for approximately 2-3 minutes on a topic assigned by the researcher in accordance to their level and syllabus of the School of Foreign Languages (Appendix F). All the presentations were recorded in case of grading adjustment. Participants from Group A (peer feedback) were divided into groups of three or four based on random grouping to assess their peers. Following the presentation, participants in Group A in accordance with their groups were asked to give oral feedback and comment about their peers' performance by completing a peer evaluation form (Appendix G). On the other hand, participants from Group B were assessed by the researcher with the use of TOEFL independent speaking rubrics (Appendix C) and a teacher evaluation form (Appendix H), who provided immediate teacher feedback. No teacher feedback was given to Group A participants. At the end of the presentations, the researcher collected the peer evaluation forms. All presentations were recorded in case of different scoring of two raters. The participants of both groups were then given a new topic for the next presentation for the second treatment, which was based on relevant materials from their course syllabi. All participants were given a week to prepare their presentations.

Step 4: Administration of the second treatment (Oral Presentation) in the A1 Module

Following the initial treatment, the participants were given one week to prepare for the second presentation based on feedback from the first session. Their second oral presentations were given on October 22nd, 2018, with conditions identical to those of the first presentation. All presentations were again recorded and evaluated utilizing the same feedback methods (peer feedback in Group A and teacher feedback in Group B) and instruments employed during the first treatment.

Step 5: Administration of the third treatment (Oral Presentation) in the A1 Module

The participants of both groups were asked to prepare for their final oral presentation, which would take place on November 2nd, 2018. They were again given one week to prepare based on feedback from the first and second treatments, However, unlike with the previous treatments, participants themselves chose their speaking topics by selecting one out of three topics offered by the researchers (Appendix F). Again, all presentations were recorded and evaluated utilizing the same feedback methods and instruments as those of the first two treatments.

Step 6: Administration of the second speaking test at the end of the A1 Module

Following the three oral presentations, the same speaking test was administered at the end of the A1 module on November12th, 2018. The participants were asked to talk about a holiday which was the same topic as in their first speaking test. Again, two raters judged the learners' oral performances individually with the use of TOEFL Independent Speaking Rubric. The average of their mean scores was considered as the final grade. The test results were used to determine whether there had been steady improvement in students' speaking performance.

Step 7: Repeated treatments in the A2 Module and the third speaking test at the end of the A2 Module

During the A2 module, the three treatments of the A1 module (oral presentations with feedback) were repeated, as was the speaking test component. Participants were asked to give three oral presentations accompanied by a teacher and peer feedback. The presentation topics were designed by the researcher according to the syllabus of foreign language departments and the level (Appendix F). The repeated treatments were conducted on December 3rd, 17th, and 31st, while the A2 speaking test was conducted at the end of the module on January 10th, 2019.

Step 8: Repeated treatments in the B1 Module

During the B1 module, the three treatments and a speaking test were repeated. Participants were asked to make three oral presentations accompanied by teacher and peer feedback. The presentation topics were designed by the researcher according to the syllabus of the foreign languages department and the level (Appendix F). The repeated treatments were conducted on February 26th, March 7th, March 19th, 2019.

Step 9: Administration of the fourth speaking test at the end of the B1 Module

At the end of the B1 module, participants in both groups undertook the final speaking test. The B1 speaking test was conducted at the end of the B1 module on March 24th, 2019. The results of the final speaking test were used to assess the improvement of speaking performances comparing to the beginning of the study.

Step 10: Facilitation of the same foreign language speaking self-efficacy scale (Post-test)

At the end of the study, participants in both groups were given the same foreign language speaking self-efficacy scale (post-test). The results of the foreign language speaking self-efficacy scale were used to determine whether there had been any significant differences in pre-and post-test performance.

3.5. Data Analysis

Quantitative methods were employed for analyzing the data collected from the four speaking tests, and the foreign language speaking self-efficacy scale. Both descriptive and inferential statistics were utilized. The inferential statistics were computed via SPSS Version 21.0 software, and the means, as well as standard deviations, were calculated. Parametric tests were used in this study as the data in this study followed a normal distribution. In addition, parametric tests were employed here as they have more statistical power and are likely to detect a significant effect. A number of independent-samples t-tests were applied to compare the results between two groups, and paired-samples t-tests were used to determine whether any differences within groups in the pre-and post-test scores were statistically significant. A repeated measure analysis of variance (ANOVA) was utilized to compare the oral performances of peer assessment with rubrics and teacher immediate feedback profiles. In addition, a Pearson Bivariate Correlation was conducted to see whether there was any correlation between the two variables.

4.Research Findings

4.1. Results for Research Question #1 Are there any changes in the level of students in speaking self-efficacy?

Research question 1 intended to examine the self-efficacy level of students at the School of Foreign Languages at Gaziantep University before and following treatment. The speaking self-efficacy scale was analyzed twice, one in the beginning and one at the end of the study. Table 1 displays the mean and standard deviation of the data collected from the foreign language speaking self-efficacy scale. Means of responses of all participants were calculated.

Table 1. *Descriptive Statistics and Reliability for Foreign Languages Speaking Self-Efficacy Scale*

	N	Mean	SD	Minimum	Maximum	Range	Alpha
pre-test	33	61,5758	17,12095	24	103	79	,943
post-test	33	88,3030	15,85774	53	120	67	,944
Group A pre-test	15	65,4667	15,77007	43	103		
Group A post-test	15	95,9333	14,92106	71	120		
Group B pre-test	18	58,3333	17,95747	24	92		
Group B post-test	18	81,9444	13,99538	53	103		

The pre-test means score of the whole sample was 61.58 and the standard deviation was 17.12. The Foreign Languages Speaking Self-Efficacy Scale (pre-test) was proved to be reliable with the Cronbach's Alpha value of .943. The mid-point of the scale is 60 which is the cut-point separating low and high efficacious students. The results revealed that students

in the School of Foreign Languages possess a high speaking self-efficacy level in the pre-test. A post-test was conducted with the same foreign language speaking self-efficacy scale at the end of the year after all treatments to examine the changes in the level of participants' speaking self-efficacy. Table 1 indicates the post-test mean score was 88.30, and the standard deviation was 15.86. The range was 67 with a minimum of 53 and a maximum of 120. The results revealed that students in the School of Foreign Languages also possess a high speaking self-efficacy level in the post-test. The Foreign Languages Speaking Self-Efficacy Scale (post-test) was proved to be reliable with the Cronbach's Alpha value of .944. Comparing the pre-test and post-test total mean scores, an increase from 61.58 to 88.30 in students' speaking self-efficacy level was observed.

The results of a paired-samples t-test was analyzed to reveal the difference in the levels of speaking self-efficacy between the participants of within group A and group B.

Table 2. *Summary for Paired-Samples t-test for Speaking Self-Efficacy Scale*

Sources of variance		N	Mean Difference	SD	T	df	R square change	P
	Group A (pre & post-test)	15	-30.46667	10.6962	11.032	14	.758	.000
Within Groups	Group B (pre & post-test)	18	-23.61111	15.24752	6.5700	17	.569	.000

Table 1 and 2 displays the mean scores of group A (peer feedback group) increase from 65.47 (SD=15.77) in pre-test to 95.93 (SD=14.92) in post-test with a correlation of .758. The difference in mean in group A was -30.47 (SD=10.70), t(14)=11.032, p=.000. The mean scores of group B (teacher feedback group) increase from 58.33(SD=17.96) in pre-test to 81.94 (SD=13.99) in post-test with a correlation of .569. The mean difference was -23.61 (SD=15.25), t(17)= 15.24752, p=.000. The analysis from Table 1 and Table 2 confirm that group A has a higher speaking self-efficacy level than that of group B in post-test. Moreover, according to the table, there are significant differences within students' mean scores in both groups on the Foreign Languages Speaking Self-Efficacy (p<.001). The results suggested that the difference between the two scores is statistically significant.

The result of another independent-samples t-test (two-tailed) was analyzed for identifying the possible means differences between group A and group B of the same speaking self-efficacy scale and the significant changes between pre-test and post-test.

Table 3. *Summary of Independent-samples t-test for Speaking Self-Efficacy Scale*

Source of Variance		Mean Difference	SD difference	F	T	df	P
Between	Pre-test	7.13333	5.94482	1.200	1.200	31	.239
Groups	Post test	13.98889	5.04122	2.775	2.775	31	.009

Table 3 indicates there was no significant difference found between group A (M=65.47, SD=15.77) and group B (M= 58.33, SD= 17.96) in the pre-test, t (31) =1.200, p=.239. While, for post-test, there was a statistical difference in the mean of the scores in post-test between group A (M=95.93, SD=14.92) and group B (M=81.94, SD= 13.99), t (31) =2.775, P=.009.

4.2. Results for Second Research Question #2 Is there a statistically significant difference in terms of oral performances after treatment?

This research question determined the students' oral performances after receiving peer and teacher feedback. The speaking test was analyzed four times at the beginning of A1 and end of A1, A2 and B1 module. Table 4 represents the results of a repeated measures ANOVA test of speaking tests in different modules.

Table 4. *Descriptive Statistics for four speaking tests*

Test	Group	N	Mean	SD
Speaking Test 1	A	15	3.8667	1.06010
	B	18	2.9444	1.10997
	Total	33	3.3636	1.16775
Speaking Test 2	A	15	4.2667	1.38701
	B	18	3.4444	.70479
	Total	33	3.8182	1.13067
Speaking Test3	A	15	8.6667	1.63299
	B	18	7.1389	2.11302
	Total	33	7.8333	2.03357
Speaking Test 4	A	15	10.1000	1.47842
	B	18	8.4444	1.70543
	Total	33	9.1970	1.78946

For the first speaking test, the mean scores were 3.87 (SD=1.06) in group A and 2.94 (SD=1.11) in group B. The mean scores of the second speaking test were 4.27 (SD=1.39) in group A and 3.44 (SD=.70) in group B. For the third and fourth speaking test, the mean scores of group A and group B were 8.67 (SD=1.63), 7.14 (SD=2.11) and 10.10 (SD=1.48), 8.44 (SD= 1.71) respectively. The results show that there was a steady increase in both groups.

The results of the repeated measures ANOVA test for four speaking tests were given in Table 5:

Table 5. *Summary of repeated measures ANOVA test for four speaking tests.*

	Group	N	Mean Difference	SD	T	Df	R	P
Source of Variance (Within Groups)	A	15	-6.23333	1.27988	18.862	14	.533	.000
	B	18	-5.50000	1.85504	12.579	17	.185	.000

As Table 5 illustrates, the mean scores for speaking pre-test of group A (peer feedback group) increase from 3.87 (SD=1.06) in pre-test to 10.10 (SD=1.48) in post-test with a correlation of.533. The difference in mean scores of speaking pre-test in group A was -6.23 (SD=1.28). The mean scores of group B (teacher feedback group) increase from 2.94 (SD=1.11) in pre-test to 8.44 (SD=1.71) in post-test with a correlation of .158. The mean difference was -5.50 (SD=1.86). Comparing the first speaking test score and the final speaking test score, those who participated in the peer assessment made gains of about 161.21% in the post-test mean scores. Those who received teacher feedback improved by 212.36%. The result analysis confirms that group B with teacher feedback has greater improvement in speaking proficiency than that of group A in post-test. Moreover, according to the table, there are significant differences between the two profiles students' mean scores on the speaking tests (p<.001). The results suggested that the difference between two scores within Group A (M=-6.23, SD = 1.28) and Group B (M=-5.50, SD=1.86) are statistically significant (p<.001).

The results of another independent-samples t-test were analyzed to identify the mean scores of each speaking test and to examine the differences between groups in oral performances.

Table 6. *Summary of Independent-samples t-test for four speaking tests*

Source of Variance	Test	Mean Difference	SD difference	F	T	Df	P
Between Groups	1	.92222	.38027	.340	2.425	31	.021
	2	.82222	.37347	8.905	2.202	31	.035
	3	1.52778	.66817	.035	2.287	31	.029
	4	1.65556	.56177	.949	2.947	31	.006

The results in Table 6 indicated there was a statistical difference in the mean of the scores between group A (M=3.87, SD=1.06) and group B (M=2.94, SD=1.11) in the first speaking test, t (31) =2.425, p=.021. There was also a statistical difference in the mean scores of the second speaking test between group A (M=4.27, SD=1.39) and group B (M=3.44, SD=.70), t (31) =2.202, P=.035. While for the third speaking test, there was also a significant difference in the mean scores between group A (M=8.67, SD=1.63) and group B (M= 7.14, SD=2.11), t (31) =2.287, P=.029. For the final speaking test, a significant difference in the mean scores

between group A (M=10.10, SD=1.48) and group B (M=8.44, SD= 1.71) was found, t (31) =2.947, P=.006. Overall, there is a statistically significant result in oral performances in speaking tests (p<.05).

4.3. Results for Third Research Question #3 Is there a correlation between reported speaking self-efficacy level and oral performances following feedback?

This research question aimed to examine the possible relationship between the students' speaking self-efficacy beliefs and their performances in speaking tests.

Table 7. Correlation between the scores on speaking self-efficacy and oral performances

		Speaking performance	Speaking self-efficacy
Speaking performance	Pearson Correlation	1	.235
	Sig. (2-tailed)		.189
Speaking self-efficacy	Pearson Correlation	.235	1
	Sig. (2-tailed)	.189	

The results of a Pearson Bivariate Correlation in Table 7 revealed that there is not a significant relationship between participants' speaking self-efficacy level and their oral performance (r=.235, n=33, p=.189). Thus, there is not sufficient evidence to state that this correlation exists in the population.

5. Conclusion and Discussion

The primary purpose of this study was the exploration of the relationship between speaking self-efficacy level of learners and the effects of oral presentation after receiving teacher and peer feedback at the School of Foreign Languages of Gaziantep University. The results of the Foreign Language Speaking Self-Efficacy Scale revealed that students at the School of Foreign Languages of Gaziantep University possessed a high level of speaking self-efficacy level. The study implies that feedback is essential in developing a learner's speaking self-efficacy level, which will enrich their positive learning experiences and will develop their speaking skill. The findings also suggest that enhanced speaking self-efficacy can encourage learners in their speaking process and feel efficaciously to perform better. These results were echoed by similar findings in Asakereh, and Dehghnnezhad (2015), which identified a positive relationship between speaking skills achievement and speaking self-efficacy levels. They observed that higher speaking self-efficacious learners are more likely to perform better in speaking. Similarly, a study conducted by Leeming's study (2017) also revealed that students grew in speaking self-efficacy over the course despite the growth rate varies when they were given a chance to practice. The findings of this study also contributed a clearer understanding of vicarious experiences proposed by Bandura (1997) which suggests that positive experience help to enhance greater self-efficacy, and as a result leading to greater effort and more positive learning experiences. Strengthened self-efficacy can also lead to higher motivation, persistence, and their feelings of self-confidence (Bandura, 1984). Mills (2014) suggests that developing the self-efficacy beliefs of language learners can help

them feel more competent and capable in their ability to complete a learning task. Ultimately, speaking self-efficacy beliefs was a strong predictor of speaking skill achievement.

Secondly, the results of a repeated measures ANOVA test and an independent-samples t-test have also been employed to see the oral performances between and within groups after oral treatments are different. The findings showed that learners in both groups had demonstrated a significant improvement in their oral performances. In addition, students who received teacher feedback have demonstrated more significant improvement than those who received peer assessment. The findings also suggest that a higher number of oral treatments provide learners plenty of opportunities to glimpse at their performances over time and hence develop and enhance their speaking ability. Obtaining feedback also gives learners the opportunity to identify their own mistakes from the teacher or peers' perspective and hence to regulate ways to approach the task or complete the tasks accordingly and effectively. Feedback can be used as a strategy to achieve learning goals. Considering the results in the first speaking test and the final speaking test, students in peer feedback group improved by 161.21% while students in teacher feedback group improved by 212.36%. These results suggested that teacher feedback group had more significant improvement than that of peer feedback group. These findings were also echoed by those of Murillo-Zamorano and Montanero (2017), who observed that both peer assessment and teacher feedback improved students' oral performance, however, unlike the findings of our study, students received peer feedback improved more than those who received teacher feedback in the post-test. Similarly, the result of our study was also similar to that of Konold, Miller and Konold (2004). They have found that teacher feedback has enhanced learning and students' performances and helped learners to focus on what had to be done for improvement.

Finally, the result of a Pearson Bivariate correlation analysis was analyzed to determine the existence of a relationship between speaking self-efficacy level and the effects of different feedback on oral performances. The findings showed that there was no relationship between the two variables. The results of this study could not represent the results of all universities in Turkey as the collected data can be different if participants had been selected from different universities. English programs, prep-school syllabi, and background information may cause significant changes in the results.

This research was significant, firstly, because it reveals a difference in the effect of feedback type on speaking self-efficacy. Secondly, no similar study concerning speaking self-efficacy level and the effect of peer and teacher feedback on oral performances have been conducted in higher education in the Turkish context. More studies can be conducted to have a better and clear picture of the relationship between these two variables among EFL learners. In addition, no similar studies have been conducted in the EFL context, thus this study can fill in the gap in the EFL field. Future studies may also aid educators in determining the types of feedback form affecting learners and enable them to speak more accurately and fluently. Future studies may also aid educators with the ways of enhancing learners' beliefs in their speaking abilities.

Yet, there are a number of limitations in this study. First, the generalizability of the results is limited by the number of participants (N=33). The number of participants is too small, and hence it limited the scope of sphericity. A larger number of students is needed to prove the compatibility of this study. Future studies might employ a larger scale of the sample consisting of preparatory schools (both public and private universities) in different parts of Turkey for better and more accurate results. Students of different departments can be chosen to determine whether there is a difference in the level of speaking self-efficacy and oral performances. Secondly, only two experimental groups are involved. The reliability of data is

impacted by the lack of a control group. Also, the participants were chosen based on convenience sampling, and this might have had an impact on the results. The sample size was small, with only thirty-three participants; moreover, it was a convenience sample with two experimental groups and, hence cannot be a generalization for the School of Foreign Languages. This might have had slight effects on the current results. In future studies, the sampling procedure could be developed by employing a random sampling method instead of convenience sampling. Another limitation was the time of the study. The study was carried out only for three modules which might have limited the time for students to develop their speaking skills. In addition, the training time for peer feedback group in how to give peer feedback was short in which might have affected the way participants gave peer feedback. In this case, participants may not have exerted much effort in giving peer feedback accurately and fairly. Had it been extended over a longer period of time, more statistically significant results might have been obtained regarding differences and improvements in students' oral performances.

In light of research findings, the following recommendations and suggestions should be considered: EFL teachers should direct the teaching and learning processes to strengthen learners' efficacy on the subject (Bandura, 1984, 1997). They should employ various speaking activities such as role-play, dialogue practices and projects in class to enhance students' confidence, fluency, and accuracy in their speaking. Teachers and peers can come together to give feedback after speaking activities. Using praises and giving constructive feedback can help to increase students' confidence and enrich the positive learning experience. In this way, learners possess positive attitudes in speaking and perform better in daily conversation as well as speaking tests and exams. Moreover, it is impressive to observe students' significant improvement in oral performances within such a short period of time. Students were more aware of their types of errors they had made in order to avoid repeating them on future presentation and, thus, improve their oral performance. This situation may suggest that more opportunities should be given to students to enhance both speaking self-efficacy and oral performances. A higher number and frequency of oral treatments may be able to improve students' oral performances within a shorter period of time. For the feedback, teachers should give more detailed and comprehensive feedback to the students. Teachers can point out general speaking errors by students in class and ask students to exchange their ideas. To enhance the effectiveness of peer feedback, more careful training and structuring are required. Teachers should explain peer feedback expectations to the learners as well as guide them throughout the process in order to minimize potential consistencies associated with subjectivity. Moreover, peer feedback group should be trained adequately and should be encouraged to give feedback with fair judgments. Peers can write down the errors on board and make others aware of and spot out the mistakes they have made during presentations. These procedures not only inform students of their abilities and progress in learning but also motivate them to perform well continuously and make them challenge with each other. Also, had it been extended over a longer period of time, more statistically significant results might have been obtained regarding differences and improvements in students' oral performances.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE RELATIONSHIP AMONG ORGANIZATIONAL MYOPIA, ORGANIZATIONAL RESILIENCE AND ORGANIZATIONAL SUSTAINABILITY AT A HIGHER EDUCATION INSTITUTION IN TURKEY: A STRUCTURAL EQUATION MODELLING*

Research article

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Abstract

This study aimed to introduce a structural equation model of testing the mediation role of organizational resilience in the relationship between organizational myopia and organizational sustainability. Thus, it was designed with structural regression model. In the study, it was aimed to collect data from a higher education organization which had already received "Turkey Continuity in Excellence Award". For this purpose, the participants of the study comprised purposefully selected 322 academics at Sakarya University, which was the only university in Turkey having the relevant award holistically. For the data collection, "Organizational Sustainability Scale" developed by Sezen-Gültekin (2019), "Organizational Resilience Scale" and "Organizational Myopia Scale" adapted to educational organizations by Sezen-Gültekin (2019) were utilized. As result, it was found that the established model had acceptable and excellent compliance values. In addition, it was determined that the organizational myopia independent variable directly affected the organizational resilience dependent variable, while it was both directly and indirectly organizational sustainability dependent variable. It was also seen that the organizational resilience independent variable directly affected the organizational sustainability dependent variable. In addition, it was observed that the organizational myopia and the organizational resilience variables had indirect effects on the sub-dimensions of executive, economic, social, cultural and environmental sustainability.

Keywords: Continuity in Excellence Award, higher education institutions, organizational myopia, organizational resilience, organizational sustainability, quality management

1. Introduction

Organizations in a rapidly developing and changing world order must follow the strategies and policies that are appropriate for their purposes, and enable them behave accordingly in order to survive. It is a widely known fact that organizations survive in line with their goals and even go beyond these goals necessitates not only to follow these determined strategies and policies, but also to base them on realistic basis. For this, organizations need to run both their past, their current situation and their future at the same time in their planned strategies and policies, in order to continue their existence and further their present positions in a way that will contribute positively to their goals. Because the future is an extension of the past and the present.

Organizations are always in an effort to exist for their purposes. For this reason, they make efforts sometimes to protect their existence, and sometimes to put their presence in front of other organizations. When it is evaluated in terms of public and private sectors, it can be said that this situation occurs more in the private sector. Because, on one hand, the nature of the private sector leads organizations to competition and therefore to the war of existence in this competition. On the other hand, the competition situation in the private sector may show itself at a lower level in public sector since the resources in this sector are provided by governments and works are carried out on behalf of the governments. This situation makes the concerns and actions of the organizations in the public sector related to sustain their existence more limited. Because the claim that "if there is a government, public institutions and organizations will also exist", which is a general idea, seems to make the issue of sustaining existence no longer an issue in public organizations. It can be said that these are pertinent claims. Ultimately, their sustainability is more limited since the financial resources in the private sector are based on individuals; however, the issue of sustainability can proceed in direct proportion to the government's survival or management policy since the funder in the public sector is largely government itself. Nevertheless, considering that competition and entrepreneurship are reflected in every field with the effect of globalization, it can be said that sustaining existence in the public sector has become an issue today.

It can be said that higher education institutions worldwide have a more autonomous structure compared to other public institutions and organizations. For example, in the organizational chart of Turkish Ministry of National Education (http://www.meb.gov.tr/meb/teskilat.php), Turkey Council of Higher Education is an institution that organizes all higher education and directs the activities of higher education institutions, has autonomy and public legal personality within the framework of duties and powers assigned to it by law although it is seen as directly located in an established relationship with the minister of national education (T.C. Resmi Gazete, 1981). This situation creates a more autonomous structure in higher education compared to other education and training levels in Turkey in terms of education, research and development, scientific work, service to society, management of human resources and administrative aspects.

The main objectives of Turkish higher education institutions are to conduct scientific studies and research at a high level, to produce information and technology, to disseminate scientific data, to support development and development in the national field, to cooperate with domestic and international institutions, to become an outstanding member of the scientific world, and to contribute universal and contemporary development (T.C. Resmi Gazete, 1981). For this reason, both national as well as from university in Turkey are expected to contribute to the development of the country at the international level. In this context, it can be stated that on one hand universities can have a sustainable structure with government support as a public institution, on the other hand, they are in a riskier formation in terms of sustainability with their public legal personality considering their work in the national and especially international arena. Ultimately, it can be predicted that universities have a competitive structure because of their autonomous structure and functional nature, and also it can be argued that this competitiveness brings along an effort of existence. This claim is supported by the national and international university rankings put forward by different institutions such as The Times Higher Education World University Rankings, which was founded in 2004 and is an institution which publishes the list of the world's best universities, and University Ranking by Academic Performance (URAP), which was established in 2009 within the Informatics Institute of the Middle East Technical University and adopts making Turkish and world university rankings as social services (http://tr.urapcenter.org).

Similarly, with the increasing competition, the concept of quality, which has been adopted by the private sector for many years, has also shown itself in public institutions and organizations. As a matter of fact, quality organizations have been established at both national and international levels due to the fact that the issue of quality keeps the pulse of the organizational process, whether it is a private or public institution. Thanks to these organizations, it has been started to examine where institutions are in terms of quality and where their quality carries them in world competition. For example, the European Organization for Quality, founded in 1956, is an organization that has approximately 70,000 members from 40 countries and examines the quality actions of approximately 500,000 organizations (http://www.eoq.org/home.html). Similarly, established in 1990 in Turkey, Turkey Quality Association (KalDer) is an organization which provides its members with trainings and services on quality and excellence, analyzes their quality actions and gives awards in certain areas related to quality (http://www.kalder.org). Instead of having initially only industry-oriented actions, KalDer has begun to display a wide range of activities, including not only the private sector but also public institutions and organizations as the years progressed and the perspective on quality changed. One of the most important of these activities both in the private and public sectors in recent years is the continuity in excellence award. The aim of this award is to re-recognize the institutions and organizations, which have received Turkey Excellence Award previously since they have continually improved their performance and have had outstanding success by transforming the strategy into action, for their excellent performance and continuous improvement over the past time, and thereby to demonstrate the permanence of their success and achievements and the continuity of their journey to excellence. When examined the previous award of excellence, it is seen that both private companies and different organizations such as public schools and universities have received awards in maintaining excellence. When considered higher education institutions in this field, it is seen that Sakarya University is the only one that received awards on university basis, while Anadolu University Faculty of Engineering and Uludağ University Gemlik Asım Kocabıyık Vocational School have received awards on unit basis. So, it is observed that the diameter of the award was rather limited in higher education institutions.

For this reason, it can be seen that higher education organizations are increasingly based on their efforts to sustain their existence within the scope of national and international policies. In the end, even if the opening and closing of universities in Turkish higher education are shaped according to the governmental policies, it can be said that many intra-organizational operations such as organizational performance, crisis management, success and problem solutions have prepared the existential future of universities. In this regard, examining the factors which position the institutions in Turkish higher education to have a sustainable structure in which the institutions can preserve their existence and pull ahead this existence of other organizations in the national and international arena, is important in terms of directing Turkish education policies. For this reason, in this study, the concept of organizational sustainability is examined by considering universities within the scope of Turkish higher education. In revealing this concept, the concepts of organizational myopia and organizational resilience are addressed, and the relationships among these three concepts are discussed. In order to understand these relationships, it will be useful to present the definitions made in the literature regarding the concepts used in the research.

The concept of myopia means living in a world where individuals intentionally and unintentionally liquidate, destroy and eliminate the possibility of creating multi-layered diagnostic capabilities for their own interests (Chikudate, 2002a; 2002b). It also means the problem of failing to perceive the errors in the methods and practices used, and possible future opportunities and risks in an organization (Altınay, Mercan, Aksanyar & Sert, 2012).

In this context, organizational myopia is the organization's ability to act with a limited capacity to evaluate the facts as it is and to see possible developments (Catino, 2013).

In a narrow sense, resilience refers to a broad concept that includes psychological, behavioral and cognitive regulation within the framework of emotional, personal, relational and organizational functioning (Day & Gu, 2014), while, in a broad sense, resilience is to ensure that states, communities and global organizations work to empower and protect people (Malik, 2014). In this context, it is considered that organizational resilience is considered as the ability of an organization to resist negative and stressful situations, its ability to maintain its existing positions and its ability to benefit from them by benefiting from negative conditions (Kantur & İşeri-Say, 2015).

Sustainability is related to the economic, social and environmental impacts of an organization in the long run (Jeong, 2015), while organizational sustainability is not just an attitude that maintains itself by preserving profitability; it is also an action that successfully balances people, prosperity and planet (3Ps) by seeking a dynamic balance (Wals & Schwarzin, 2012). In this context, it can be defined that sustainability of organizations is not only to maintain their existence for the purpose of their interests, but also to move in a balanced way by carrying the logic of sustainability to their outside world and to all levels of the organization, and to establish a future by trying to keep their assets alive in line with their goals.

As a matter of fact, based on these definitions, it can be said that the concepts of organizational myopia, organizational resilience and organizational sustainability are related to the past, present and future of an organization. However, this situation may vary when approached from a limited perspective. According to Hammond, real sustainability is about how the business is grown in the future, while resilience refers to how to protect what is owned and how to avoid problems. For this reason, sustainability is a more general and comprehensive strategy that should include the concept of resilience (Lattimore, 2016). On the other hand, organizational myopia means to save present day in a narrow sense (Baş, 2013). With reference to these reasons, it can be said that organizational myopia and organizational resilience predominantly focuses on present day of an organization, while organizational sustainability is a direct future-oriented concept. However, it can be claimed that one aspect of organizational myopia is essentially based on the past as it expresses the fact that an organization has limited its perspective due to its past actions, that resilience reflects predominantly the actions of present day as it expresses to survive in the events experienced and to regain its former state, that organizational sustainability is the foundation of the future as it expresses the existence of an organization by increasing its continuity in the future. It should be pointed out at this point that the concepts cannot be strictly separated in terms of time periods. Ultimately, from the perspective of opportunity, the concepts of myopia and resilience are always an investment for the future. Likewise, sustainability takes its foundations from the past and today. However, the point that is intended to be emphasized with this distinction is that these three terms discussed within the scope of this study are designed to support each other in the form of "past, present and future" of an organization. In this regard, the model followed within the scope of this study is as follows.

Figure 1. Past, present and future of an organization in the context of organizational myopia, organizational resilience and organizational sustainability

According to Figure 1, the concepts of organizational myopia, organizational resilience and organizational sustainability are in a cyclical, continuous relationship with the past, present and future of an organization. According to Hammond, sustainability refers to optimism, and resilience refers to realism, and both are needed (Lattimore, 2016). In this regard, if the concept of organizational myopia is considered as a negative situation, in fact, this study deals with the effect of realism (organizational resilience) in getting an optimistic picture (organizational sustainability) from a negative situation (organizational myopia) in organizational life. In this context, the aim of this study is and to create a model which reveals the effect of organizational myopia on organizational sustainability through organizational resilience according to the opinions of the academician by considering the relationship between these three concepts. Therefore, ***the hypotheses of the study*** can be stated as follows:

Hypothesis 1.

H0: Organizational myopia does not directly explain organizational resilience.

H1: Organizational myopia directly explains organizational resilience.

Hypothesis 2.

H0: Organizational myopia does not directly explain organizational sustainability.

H1: Organizational myopia directly explains organizational sustainability.

Hypothesis 3.

H0: Organizational resilience does not directly explain organizational sustainability.

H1: Organizational resilience directly explains organizational sustainability.

Hypothesis 4.

H0: Organizational myopia does not indirectly explain organizational sustainability through organizational resilience.

H1: Organizational myopia indirectly explains organizational sustainability through organizational resilience.

2. Method

2.1. Research Model

This research model of the study was the relational screening model, one of the quantitative research methods. The relational screening model aims to determine the presence or degree of co-change between two or more variables (Karasar, 2012). In this context, the relationship between organizational resilience and organizational sustainability was determined according to the opinions of academics at Sakarya University, which is a higher education institution.

2.2. Population and Sample

In this study, it was aimed to collect the data from a higher education organization which received the "Turkey Continuity in Excellence Award". For this purpose, because of the fact that Sakarya University was the only university in Tukey obtaining the relevant award holistically, 322 academics at Sakarya University constituted the participants of this study. According to the Turkish Council of Higher Education 2018 data, at the university there were 262 Professors, 206 Associate Professors, 540 Assistant Professors, 435 Instructors and 560 Research Assistants. Approximately 35% (f = 708) of these academics were female and 65% (f = 1295) were male (Yükseköğretim Bilgi Yönetim Sistemi, 2018). In the determination of the study sample, maximum diversity method was adopted by following purposeful sampling of non-random sampling types. The main purpose of using maximum diversity was to obtain opinion from each participant profile with a different academic title. In this respect, 322 volunteer academics were included in the study. Out of these 322 academics, 139 were female and 183 were male.

2.2. Population and Sample

Organizational Sustainability Scale (OSS): Developed by Sezen-Gültekin (2019), the scale is a 5-point Likert type "totally disagree, disagree, undecided, agree, totally agree", and the scores obtained from the scale vary between 1-5. On the assumption that these ranges are equal, it was accepted that if the organizational sustainability level is very low in the range of 1.00-1.79; low in the range of 1.80-2.59; moderate in the range of 2.60-3.39; high in the range of 3.40-4.19; and very high in the range of 4.20-5.00. In this context, getting high scores from the scale indicates that the level of organizational sustainability is high. The scale consists of 39 items in five sub-dimensions as environmental sustainability, cultural sustainability, social sustainability, economic sustainability and executive sustainability.

In the study, the scale was found to be a valid and reliable scale as the results of exploratory and confirmatory factor analysis, and internal consistency and composite reliability coefficients. The internal consistency coefficient for the reliability of the scale was calculated with Cronbach Alpha, and it was determined that the Cronbach Alpha value for the overall scale, which was composed of 39 items and had a five-factor structure, was found to be .98. When the reliability of the sub-dimensions of the scale was evaluated, both Cronbach alpha internal consistency coefficient and composite reliability coefficients were calculated. In this context, it was determined that the reliability values of the sub-dimensions of the scale were as follows: Cronbach alpha .93 and composite .99 for social sustainability; Cronbach alpha .89 and composite .98 for cultural sustainability; Cronbach alpha .87 and composite .98 for environmental sustainability; Cronbach alpha .87 and composite .98 for economic sustainability; The Cronbach alpha .98 and the composite .99 for the executive sustainability.

Organizational Resilience Scale (ORS): The scale was developed by Kantur and İşeri-Say (2015) in business organizations and adapted to the educational organization Sezen-Gültekin (2019). Although the scale was originally developed as 9 items in three sub-dimensions as robustness, integrity and agility; it was confirmed with a 9-item structure in a single dimension as the results of the validity (exploratory and confirmatory factor analysis) and reliability analyzes. The internal consistency coefficient for the reliability of the scale was calculated with Cronbach Alpha, and it was determined that the internal consistency coefficient determined by Cronbach alpha for the single factor structure consisting of 9 items was found to be .95 for the overall scale.

Organizational Myopia Scale (OMS): The scale was developed by Aytemiz Seymen, Kılıç and Kinter (2016) and adapted to the educational organization by Sezen-Gültekin (2019). Originally developed with a total of 24 items in four sub-dimensions, the scale was validated with a total of 18 items in three dimensions as individual, organizational and professional myopia as a result of the validity (exploratory and confirmatory factor analysis) and reliability procedures performed in this study. In this context, it was determined that the reliability values of the sub-dimensions of the scale were as follows: Cronbach alpha .70 and composite .98 for individual myopia sub-dimension; Cronbach alpha .82 and composite .94 for professional myopia sub-dimension; Cronbach alpha .81 and composite .97 for organizational myopia sub-dimension.

3. Findings

Frequency distribution and extreme values were examined in order to see whether the data obtained from a total of 359 participants had normal distribution. In addition, all points were converted to Z score type and one-way analysis of outliers was performed by analyzing the distance of the data from the mean. In this context, 37 data which were found to impair normality were excluded from the analysis, and then the remaining 322 data were re-analyzed, and it was seen that there were no extreme values in these 322 data.

Table 1. *Descriptive findings related to the data*

	N	Min. Value	Max. Value	Mean	SD	Skewness	Kurtosis
Overall Organizational Sustainability	322	1,10	4,97	3,20	,80609	-,298	-,264
Environmental Sustainability	322	1,00	5,00	3,00	,91167	-,082	-,408
Cultural Sustainability	322	1,20	5,00	3,21	,85379	-,182	,-440
Social Sustainability	322	1,00	5,00	3,15	,92612	-,215	-,466
Economic Sustainability	322	1,00	5,00	2,89	,89788	-,055	-,375
Executive Sustainability	322	1,00	5,00	3,36	,88528	-,606	,054

Organizational Resilience	322	1,00	5,00	3,31	,89354	-,490	-,006
Overall Organizational Myopia	322	2,28	4,94	3,79	,48579	-,152	-,201
Individual Myopia	322	2,40	5,00	4,27	,48420	-,453	,526
Professional Myopia	322	1,86	5,00	3,90	,60838	-,553	,450
Organizational Myopia	322	1,00	4,83	3,26	,76778	-,552	,190

According to Table 1, it was seen that all the scales and the sub-dimensions had normal distributions. Besides, it was determined that the levels of the overall organizational sustainability and all its sub-dimensions had moderately averages (respectively M=3.20; 3.00; 3.21; 3.15; 2.89; 3.36), and the level of the organizational resilience had also moderately average (M=3,31), while overall organizational myopia and professional myopia is at a very low level (M=3.79; 3.90), individual blindness is at a very low level (M=4.27), and organizational myopia is at a moderate level (M=3.26). For analyzing the assumptions and findings regarding structural equality assumptions, Mahalanobis distance values were calculated for versatile extreme value analysis and it was observed that this value did not create contradictory observation at the level of .05. On the other hand, multiple connection control was performed to detect multiple linear connections, and variance increase factors (VIF) and tolerance values (TV) were examined. The findings were presented in Table 2.

Table 2. *Examination of the Relationship among Variables*

	Overall Organizational Sustainability	Environmental Sustainability	Cultural Sustainability	Social Sustainability	Economic Sustainability	Executive Sustainability	Organizational Resilience
	r	r	r	r	r	r	r
Organizational Resilience	,792**	,487**	,615**	,767**	,590**	,832**	1
Overall Organizational Myopia	-,664**	-,445**	-,528**	-,627**	-,498**	-,689**	-,682**
Individual Myopia	-,304**	-,243**	-,245**	-,263**	-,244**	-,308**	-,302**
Professional Myopia	-,376**	-,241**	-,335**	-,351**	-,266**	-,390**	-,383**
Organizational Myopia	-,753**	-,494**	-,563**	-,727**	-,572**	-,785**	-,782**

*p .05 ** p< .01 ***p<.001

Büyüköztürk (2011) states that the level of the relationship between 0.00-0.30 is low, between 0.30-0.70 is medium; between 0.70-1.00 is high. When the data in Table 2 were examined, it was seen that all the relationships were meaningful at .01 level, and there was no multiple connection between the variables in the model since all the relationships were less than 0.90. Therefore, it was determined that structural equation model can be made. In addition, in the analysis of the data, the tolerance (>0,2) and VIF (<10) values were also examined in order to determine the multiple linear connection problem between the variables, and it was consequently observed that there was no multiple connection problem between the variables (Mertler & Vannatta, 2005). Finally, the sample size was tested to see if a sample group of 322 people was sufficient for structural equation analysis. Thus, the sample volume used in the study was found to be sufficient (Harrington, 2009, cited in Bayram, 2010). For this reason, it was determined that the assumptions regarding structural equality were provided. In this context, by establishing a structural equation model, the predictive relationships between organizational myopia, organizational resilience and organizational sustainability were analyzed.

Table 3. *Excellent and acceptable fit values for structural regression analysis*

Fit Criteria	Perfect Fit Values	Acceptable Fit Values	Fit Values Obtained
$(\chi2/sd)$	≤ 3	≤ 4-5	2,78
AGFI	≥ 0.90	$\geq 0,85$	0,85
GFI	≥ 0.90	$\geq 0,85$	0,89
CFI	≥ 0.97	$\geq 0,90$	0,96
IFI	≥ 0.95	$\geq 0,90$	0,96
RMSEA	≤ 0.05	0,06-0,08	0,07
SRMR	≤ 0.05	0,06-0,08	0,04

When the fit values in the Table 3 were examined, it is seen that the model has acceptable and perfect ($\chi2/sd$ (306.687/110)= 2.79; RMSEA = 0,07; SRMR = 0,04; CFI = 0.96; IFI=0.96; GFI = 0.89; AGFI = 0.85) fit values (Baumgartner & Homburg, 1996; Bentler & Bonett, 1980; Bollen, 1990; Browne & Cudeck, 1993; Byrne, 2006; Hu ve Bentler, 1999; Joreskog & Sorbom, 1993; Kline, 2011; Marsh, Hau, Artelt, Baumert & Peschar, 2006; Steiger, 2007; Schermelleh-Engel & Moosbrugger, 2003; Tanaka & Huba, 1985). In this context, the structural regression model developed and tested was shown in Figure 2. The information on the direct and indirect effects of the variable tested in the model was also given in Table 4.
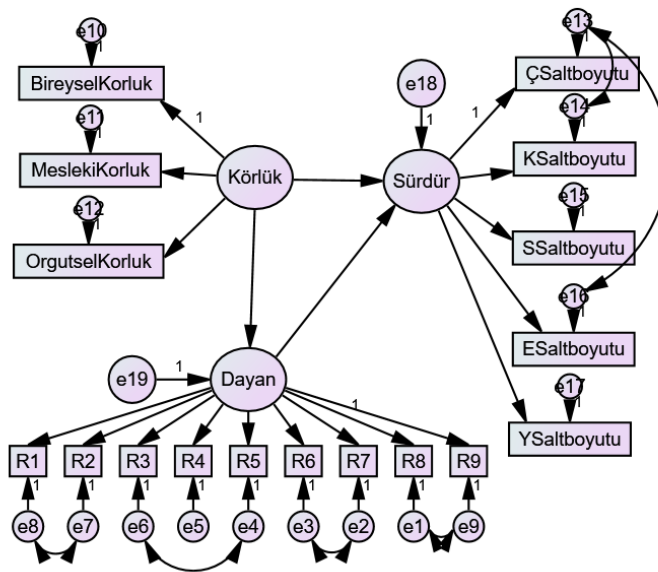
Figure 2. Structural regression model developed and tested

Table 4. *Direct and indirect effects on organizational sustainability variable*

Independent variable	Dependent variable	Total effect	Direct effect	Indirect effect	Standard error	Critical rate (t)
Organizational Myopia	Organizational Resilience	0,90	0,90	0,000	0,15	5,982***
Organizational Myopia	Organizational Sustainability	0,88	0,55	0,33	0,87	2,698**
Organizational Resilience	Organizational Sustainability	0,36	0,36	0,000	0,76	2,006*

According to Table 4, it was found in the model that on one hand, organizational myopia directly affects organizational resilience (β = 0.90, p <0.001), while organizational myopia affects organizational sustainability both directly (β = 0.88, p <0.01) and indirectly (β = 0.33, p <.001); on the other hand, organizational resilience also directly affects organizational sustainability (β = 0.36, p <0.05). In addition, it was observed that organizational myopia and organizational resilience have indirect effects on the sub-dimensions. These effects are as follows, respectively: executive sustainability sub-dimension (β = 0.85; 0.35), economic sustainability sub-dimension (β = 0.70; 0.29), social sustainability sub-dimension (β = 0.82; 0.34), cultural sustainability sub-dimension (β = 0.69; 0.28) and environmental sustainability sub-dimension (β = 0.59; 0.24). According to the model, organizational myopia alone explains 81% (R2=0.81) of organizational resilience, and 44% (R2=0.44) of organizational sustainability, while organizational resilience alone explains 63% (R2=0.63) of organizational sustainability. On the other hand, 81% (R2 = 0.81) of organizational sustainability is explained by organizational myopia and organizational resilience. Accordingly, it can be said that organizational myopia and organizational resilience significantly explain the organizational sustainability and have very high impact sizes on

organizational sustainability, while organizational myopia has also a significant and high effect size on organizational resilience. The findings are shown in Figure 3.
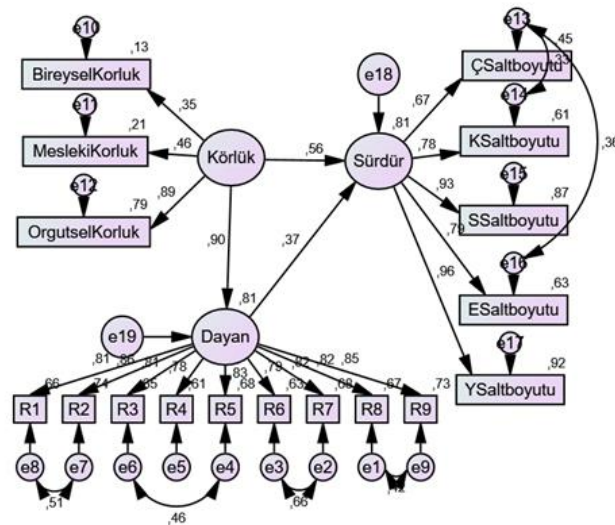
Figure 3. The findings obtained by structural regression analysis

In order to test whether the results obtained in the study is really meaningful and they have practical significance, effect size was calculated. In calculating the effect size, $0.02 \leq f2 < 0.15$ value shows the small effect, $0.15 \leq f2 < 0.35$ value shows the medium effect and $0.35 \leq f2$ value shows the wide effect (Cohen, 1988). The effect sizes calculated for each variable in the equation are shown in Table 5.

Table 5. *Effect sizes calculated for each structural equation*

Independent variable	Dependent variable	R^2	f^2
Organizational Myopia	Organizational Resilience	0,81	4,26
Organizational Myopia	Organizational Sustainability	0,44	0,78
Organizational Resilience	Organizational Sustainability	0,63	1,70
Organizational Myopia + Organizational Resilience	Organizational Sustainability	0,81	4,26

According to Table 5, it was found that organizational myopia has a wide impact on organizational resilience ($R^2 = 0.81$; $f^2 = 4.26$) and organizational sustainability ($R^2 = 0.44$; $f^2 = 0.78$); while, similarly, organizational resilience has a wide impact on organizational sustainability ($R^2 = 0.63$; $f^2 = 1.70$). In addition, it was seen that organizational myopia and organizational resilience together have a wide impact on organizational sustainability ($R^2 = 0.81$; $f^2 = 4.26$). In this case, it can be said that organizational sustainability is widely affected by organizational myopia and organizational resilience both separately and together. Finally, in the context of the power analysis, done in order to show that the rejection of H0 hypotheses and the acceptance of H1 hypotheses reveal the actual differences between the

variables, G * Power 3.1.9.4. package program was used, and the power was found to be quite high 1.00 value with $f^2 = 4.26$, .05 alpha value and 322 sample group.

4. Discussion and Conclusion

In this study, it was found out that organizational myopia had a significant and high impact size on organizational resilience, while organizational myopia and organizational resilience together explained organizational sustainability significantly and created a very high impact size for organizational sustainability. When the literature was examined, as far as reached, there was no study that directly examines the relationship between organizational myopia, organizational resilience and organizational sustainability, and examines this relationship in higher education. However, some studies support the results of this study by analyzing the relationship between myopia, resilience and sustainability conceptually.

For example, according to Vogus and Sutcliffe (2007), resilience is based on past learning and promotes future learning. Wokutch, Singal, Gerde, and Naar (2016) define resilience as the ability of an organization to maintain itself and return to its former state after shocks caused by mistakes in decision making. In other words, resilience can be considered as restoring and maintaining the organization by overcoming the situations arising due to administrative errors. In this context, it can be said that myopia which deals with organizational errors, resilience which deals with organizational problems, and sustainability which expresses the continuity of the organization are related to each other. Based on these views, this idea can be proved by the results obtained in the structural equation model confirmed in this study. Ultimately, in this study, the main starting point when establishing a structural equation model is the belief that organizational myopia is the past of the organization, organizational resilience is the present of organization, and organizational sustainability is the future of organization. As a result of the model established and tested in this direction, this starting point was confirmed and it supports the opinions of the researchers by revealing that organizational myopia and organizational resilience together explain organizational sustainability significantly and create a very high impact size for organizational sustainability.

Similarly, Catino (2013) states that organizational myopia manifests itself in the very moment when an organization fails to identify potential opportunities which can increase the reliability and resilience of the organizational system in a way to ensure long-term survival and adaptation to environmental changes. In this case, it can be said that an organization experiencing myopia can miss opportunities to increase its sustainability and resilience. Accordingly, it can be thought that organizational myopia, organizational sustainability and organizational resilience are interrelated, and even organizational myopia is a predictor of organizational sustainability and organizational resilience. This idea based on Catino's (2013) opinion was supported by the findings obtained as a result of this study. Because, as a result of the structural equation model tested in this study, it was concluded that organizational myopia is associated with organizational sustainability and organizational resilience, and moreover, organizational myopia greatly affects organizational sustainability through organizational resilience, thus organizational myopia and organizational resilience is an important predictor of organizational sustainability.

According to Robb (2000), long-term sustainability requires the organization to be in close contact with its environment, to feel the need to change, and to overcome the pain of self-restructuring, sometimes deep. This ability requires acting towards the integrity of opposites such as mind and emotion, continuing and dropping, closing in and being open-ended. This

ability is the center of organizational resilience. In other words, in order to achieve sustainability, it can be said that an organization should act using opposite situations together, and this movement underlies organizational resilience. In this regard, it can be claimed that it will be meaningful to act to start work from organizational myopia that creates an opposite situation for the organization by acting in he organizational resilience center in achieving organizational sustainability. For this reason, in this study, it was tested whether the existence of a problematic structure caused by organizational myopia which is introvert, short-term, unable to see the future, opportunities and risks provides organizational sustainability, which will enable the organization to continue its existence and move it further through organizational resilience, which allows to stand strong in the face of challenges and successfully overcome them. As a result of this test, the structure supporting Robb's view (2000) appeared in the same way and organizational myopia and organizational resilience explained an important part of organizational sustainability.

As a matter of fact, the reports published worldwide have emphasized the importance of these three terms for people, states and educational organizations. For example, according to OECD data, the distinction between "rich and well-educated countries and poor and poorly educated countries" is not valid today. Because, despite the bad socio-economic conditions in the world, many students can achieve very good results and these students are called as "resilient" because they overcome the difficulties to achieve success (Yılmaz Fındık, 2016). So, it can be stated that raising resilient students in accordance with the new world order requires the existence of resilient educational organizations at the same rate. Because the idea of "organizations with good conditions do well; organizations with bad conditions do bad things" is not valid in today's conditions when this process is evaluated in terms of educational organizations institutionally as in individual students. Because educational organizations must be "resilient" in order to achieve a sustainable structure by realizing their blind spots, developing their long-term care skills and overcoming difficulties in order to achieve success in line with their goals. In this way, resilient and sustainable education organizations, which can turn their blindness into an opportunity to focus on the future, will increase their probability of achieving positive results in line with their goals with a structure that complies with the features specified in UNESCO 2030 targets, even if they have good or bad conditions. This will pave the way for both macro and micro targets to be achieved for educational organizations. As a matter of fact, that the quality-oriented management processes, which continue especially in higher education institutions and become more and more important with the establishment of the Higher Education Quality Board, act in accordance with these specified standards will provide opportunities for addressing organizational myopia, organizational resilience and organizational sustainability together, and thereby providing a holistic future design within universities.

Similarly, the report published by UNESCO (2015) mentions 17 factors about poverty, hunger, health, well-being, education, equality, sanitation, energy, work and economic growth, industry, innovation, sustainable communities, responsible consumption and production, climate, life below water and on land, peace, justice, partnerships that will transform the world to ensure sustainability, while the report, in which the PISA 2012 results were published (OECD, 2014), addresses the issue of strengthening resilience through direct education. To the extent that it is stated in the UNESCO 2030 vision (UNESCO, 2015), educational organizations need to be reshaped for people to have a sustainable future. With this shaping, an education system that reaches organizational resilience and makes its existence sustainable by turning organizational myopia to an advantage based on strategic management will be ensured. Because myopia is perceived as a negative concept by its nature, it can be turned into a tool that can benefit organizations when it is well managed. In

this way, the Turkish education system, which can discover its blind spots, will have the opportunity to go beyond its targeted policies by reaching a future-based, sustainable and resilient organizational structure that is suitable for the age and even ahead of the age.

When it is evaluated in terms of the Turkish education system, it is seen that evaluation studies for the education system have been made by Gedikoğlu (2005), Akbaba Altun (2009), Yılmaz and Altınkurt (2011), Kartal (2013), Kesik and Bayram (2015), Sarıbaş and Babadağ (2015), Hareket, Erdoğan and Dündar (2016), but these studies remain only as problem determination and solution suggestion. Similarly, it can be said that the studies done on the evaluation of Turkish higher education by Aktan and Gencel (2007), Süngü and Bayrakcı (2010), Özer, Gür and Küçükcan (2011), Güneş (2012), Tezsürücü and Bursalıoğlu (2013) are mostly limited to the quality issue. In this context, it was see that, in the context of the Turkish education system, there is no quantitative study that integrates yesterday, today and tomorrow in a strategic context through the concepts of organizational myopia, organizational resilience and organizational sustainability of higher education, and the studies (Kılıç, 1999; Baskan, 2001; Higher Education Council, 2007; Kavak, 2011; Gül & Gül, 2015; Aykaç & Kar, 2018) carried out in accordance with this context were limited to the qualitative level within the scope of higher education policies. However, it is important to compare the higher education institutions that are the bridges between science and society in today's world, where competition is increasing and needs are shaped, and compared with quantitative findings. In this context, it can be said that this study fulfills this importance with a holistic evaluation model by considering the past, present and future of higher education institutions within the scope of organizational myopia, organizational resilience and organizational sustainability.

5. Suggestions

Organizations should consider the high-level relationships between organizational myopia, organizational resilience and organizational sustainability, and their impact on each other, and realize their organizational designs accordingly. To do this, organizations must first identify the underlying factors of organizational myopia, organizational resilience and organizational sustainability; then it should follow certain steps to manage these concepts.

When the literature is analyzed, it is stated that the concept of myopia is not always a negative concept, it can drag the organization to a negative one depending on the conditions. In this context, organizations may become aware of the points that will create myopia and prevent the factors that turn them into disadvantages. In other words, organizations should manage organizational myopia instead of detecting and leaving it. Because organizational myopia is dangerous for the organization when it is considered to get used to the routine due to the actions performed by the organization and to display a short-term perspective by not seeing the risks and opportunities. For this reason, organizations should not allow their functioning routines to blind their perspectives. To do this, organizations should strive to be a learning organization, and organizational managers can assist subordinates to eliminate individual myopia through encouraging them about following innovations, being curious about developments, self-knowledge, taking into account criticism, trying different solutions during the problem. They can also assist subordinates and colleagues to eliminate professional myopia through helping for making the nature of work more open to personal development and innovation, and for providing to get rid of the routine and make it dynamic, to ensure catching sectoral changes, to dynamize the sector and facilitate acceptance of differences. Additionally, organizational managers can also eliminate organizational myopia through increasing the interaction between the units in workplace, evaluating the feedbacks

of organization, enabling the application of new methods in doing business, creating a flexible and innovative organizational culture that is open to change.

When these suggestions are evaluated in terms of higher education within the scope of educational organizations; in order to prevent individual myopia, universities can be encouraged to encourage their academicians to become scientists who are individually innovative, curious, open to criticism, know themselves, and apply different solution strategies. For this, performance evaluation systems can be developed. On the other hand, thought that higher education is a cross-sectoral bridge, university administrations should increase the interaction between the units to create sectoral dynamics and follow the changes, and create a dynamic, collaborative, flexible culture that is open to change. In addition, by emphasizing on change management, it can be got help from different individuals or institutions in eliminating myopia through a fresh eye approach. For example, the help of an academic working in another unit can be used to eliminate the myopia in one unit. In this way, the things that the employees in that unit cannot see and become blind because they are constantly inside of the work can be observed more easily by the other person who has just entered the environment. This situation is similar to the approach used in the evaluation of different units, different universities and different institutions each other in quality processes. Therefore, as in the institutions that monitor quality management, the self-evaluation processes of the institution can be employed with a fresh eye approach within the scope of internal and external evaluation. In this way, organizations and universities are aware of the points that will create organizational myopia, and they will overcome their myopia by turning these points to positive, and thus their foundations will be laid to be more resilient.

When the literature is examined, it is seen that the concept of organizational resilience predominantly evaluates the physical or psychological resilience of an organization. However, the overall resilience of an organization is also important in the 21st century working environment, which is rapidly changing, becoming globalized and competitive. Eventually, an organization that has overcome its myopia cannot balance its existence without having a resilient structure. For this reason, organizations that want to become resilient should act quickly in any situation they encounter, seek different solutions to problems, turn hitches into opportunities, take a tough stance in the face of difficulties, continue without giving up and most importantly act as a whole.

When these suggestions are evaluated in terms of higher education within the scope of educational organizations, universities should act as a whole in addressing the problematic situations experienced in their own system or in which they live, and should take advantage of the hitches in the interests of the organization, and act quickly by producing different solutions. For this, a board can be established at universities. By holding the pulse of the university and the systems related to the university, this board can determine the possible situations not only in times of crisis but also at other times, so that the university can act as a resilient organization in case of a possible problem. Thus, they can cope with the factors that will endanger their existence. In this way, organizations and universities that have overcome their organizational myopia and have a resilient structure will be continuing their existence in the future.

When the literature is examined, it is seen that the concept of organizational sustainability focuses on different parts of the organization (campus, curriculum, etc.) through different concepts. However, it is important that an organization has a sustainable structure not only in its parts, but in its entirety. Because, according to Gestalt, the whole is more than the sum of all the parts. In this context, that the whole organization is sustainable is more important than the parts are sustainable on their own. Ultimately, surviving its myopia and eliminating its

past mistakes, an organization will continue its existence in the future by saving its present day thanks to its resilient structure, and this will create an imperative for the organization to act as a whole and manage its organizational sustainability accordingly. In this regard, organization managers should ensure that sustainability awareness is developed in all areas, and also demonstrate sustainable activities in environmental, economic, cultural, social life and management practices.

When these suggestions are evaluated in terms of higher education within the scope of educational organizations, universities should first raise awareness of their stakeholders to ensure organizational sustainability. For this, awareness activities and awareness practices can be organized. In addition, universities can make simultaneous applications in every field to put sustainability on an organizational basis. For example, on one hand, activities can be carried out both on and off campus by engaging their external stakeholders (such as TEMA, WWF, ministries, etc.) in ensuring environmental and economic sustainability; on the other hand, they can increase the activities for commemoration of special days which will be transferred from year to year with the use of symbols that reflect the culture for the survival of the organizational culture to ensure cultural and social sustainability. Besides, for newcomers to the university, social responsibility projects can be done within the scope of orientations, meeting activities and cooperation. On the other hand, universities can create an organizational structure for collaborative, open to change, resilient, benefiting from experience, developing human capital, setting sustainable goals, and clearly defining job descriptions to ensure executive sustainability. In addition, universities can appoint managers who are sustainable leaders, who can evaluate yesterday, today and tomorrow, are visionary and willing to shape the future. In this way, organizations and universities, which correctly saved their present day based on their past days, will be able to retain their existence in the future and reach a structure that can carry it further.

Universities, especially exhibiting quality management, are more planned to invest in the future. However, the main point that should be emphasized at this point is that the quality studies should not only remain at the quantitative level, but should be carried out strategically in a realistic manner on the basis of self-knowledge of organization's past, present and future. For this reason, it is recommended for higher education organizations of which quality structure were approved and recognized to follow the model developed on the basis of organizational myopia, organizational resilience and organizational sustainability revealed by this study in order to maintain the perfectionist structures. It is also recommended for the universities which have not yet started their quality studies or are at the beginning of the quality process to start their process management considering the relevant model of this study. In this context, the universities applying this model should determine the levels of organizational myopia, organizational resilience and organizational sustainability and the factors that cause them. They should continuously evaluate these results by including them in their strategic plans. By adding these three topics to the target categories in the process planning, evaluation categories especially based on these three topics should be opened in the red area graphs. In this context, these three issues should be turned into general categories in the process evaluation of the organization. In other words, the result of the target and actual rate difference in evaluating an activity should be evaluated based on organizational myopia, organizational resilience and organizational sustainability.

For example, let's say that the number of internationally contributing projects in one unit of the university is targeted as three, but this number has never been achieved for five years. In this case, the situation of doing international projects will be a situation that should be considered as the red area of that unit. When this situation is evaluated numerically within the scope of quality processes, the result will consist of only scores. Because the only thing to see

based on score is whether the targeted number is reached or not. However, this attitude is inadequate in terms of quality. Because quality should be not only quantitative but also qualitative. In this regard, the quality will be increased only if the reason for such a red area graph appeared next to the score evaluations. For this, process management should be handled gradually based on organizational myopia, organizational resilience and organizational sustainability. In this direction, the basis of why an international project could not be drawn from that unit for five years should be considered at the level of organizational myopia. In this way, it can be determined whether the state of myopia exists, if so, it will be possible whether it exists individually, professionally or organizationally. In this way, the issues such as whether academicians do not want to do projects, whether their professional burdens prevent this, or whether their managers do not support them about making projects can be clarified. As a result, ideas about how to develop the red area will show up. These situations created by organizational myopia and ideas to show the way out of these situations should be reported and turned into action goals 1 and action plan 1. While making this action target and plan, it should be estimated how much each step will serve organizational resilience and organizational sustainability. In the second stage, the action objective made, and the action plan should be addressed based on an organizational resilience. For this, first, it should be determined how the situation of not being able to make an international project causes and may cause these crises and how these crises can be overcome. The issues raised in this way should be reported as action objective 2 and action plan 2, and to what extent they will contribute to organizational sustainability. In the third phase, based on the issues raised through action target 1-2 and action plan 1-2, what can be done in terms of organizational sustainability should be reported. The items included in this report should be determined as final targets in process management, in this way, action target 3 and action 3 plan should be put forward. These steps should be followed for each of the action goals and plans prepared in this way. When these steps are followed, it is possible to determine why the relevant unit has not been able to produce an international project for five years or why such a responsibility is still expected from that unit even though it has not produce projects, how the organization has managed the crisis in the face of the issues arising from this situation, what the organization has done in shaping the future and what it can do. thus, an integrated process management will be followed. Finally, prepared action goals and plans 1-2-3 should be evaluated and updated annually, so the rate and power of change in the path of sustainability should be calculated by creating a chart of where it came from and how close it was to the targets. In this way, a quality and perfectly sustainable structure can be achieved on the basis of strategic management. In this way, the competitiveness of higher education institutions in both national and international arenas and the chance of long-term existence will increase. Thus, they will be prepared to become a new trend in the world both in Turkey focused on quality. Because the Higher Education Quality Board, which has just been established, is an indicator of how much this trend is considered in Turkish higher education institutions. Therefore, with this institution, it can be taken into consideration that the quality processes, which have been carried out so far, may become compulsory for higher education institutions. In this context, it can be claimed that it is possible to provide preliminary benefits for these institutions, if higher education institutions set the results of this study to work as soon as possible.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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AN ANALYSIS OF THE STUDENT METACOGNITION LEVEL IN PROBLEM-SOLVING VIA PROBLEM STORIES IN THE MATERIALS OF THE TWO-VARIABLE EQUATION SYSTEM

Research Article

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Abstract

This qualitative case study aimed at describing the level of students' metacognition in problem-solving using problem stories in the materials of the linear equation system of two variables of VIII class at MTs N 1 Pesawaran Lampung. The participants of the study comprised three students in VIII class of MTs N 1 Pesawaran Lampung in 2019-2020 academic year. In the selection of the participants the purposive sampling method was utilized. The data were collected via collection a test and an interview. For the data validation the triangulation technique was adopted. The results showed that the level of students' metacognition in problem-solving via story problems in the materials of linear equations of two variables was at the level of reflective use, strategic use, and aware use.

Keywords: Metacognition level, problem solving, problem stories, linear equation system

1. Introduction

Problem-solving is essential in learning Mathematics because students are required to have these abilities. However, problem-solving is not an easy thing for students, so appropriate strategies and steps are needed. Therefore, when students solve a problem, the teacher should not only see the final truth of the students 'answers but also needs to look at the students' abilities in formulating their strategies and thinking steps. In problem-solving, there is a more critical process that must be known by the teacher, namely the processes undertaken by students to get answers to the problems given, especially the metacognition process used in solving these problems. As stated in the 'Curriculum and Evaluation Standards for School Mathematics, NCTM,' problem-solving is the central vision of Mathematics education besides reasoning, communication, and connection. Problem Solving is a complex process that involves several cognitive operations, such as collecting and selecting information, heuristic strategies, and metacognition (Risnanosanti, 2008).

This metacognition involves student activities in making connections between problem questions, sifting through the information, and initial knowledge possessed. This activity requires control of the students themselves so that the problem-solving process remains focused on the solution to the problem at hand. Students' self-awareness creates student control in problem-solving in thinking. Thinking awareness is the awareness of the knowledge possessed and the awareness to do something that is thought and the reason it is done. This awareness of

thinking will increase according to the metacognitive activities that arise when solving problems. According to Suharnan's opinion, metacognition is a person's knowledge and awareness of their cognitive processes (Suharnan, 2005). The level of metacognition of a person, according to Swartz and Perkins, is Tacit use, Aware Use, Strategic Use, and Reflective Use (Cambridge Assasment International Education, 2019).

Based on observations and interviews with students during the author's observation period at MTs N 1 Pesawaran, many students had difficulty in learning Mathematics, especially in solving mathematical problems in the form of story problems, so student learning outcomes tend to be low. One area of Mathematics study that becomes a student's weak point in problem-solving was algebra, especially on the subject of the two-variable linear equation system. Many students found it difficult in this material; it could be seen from the low grades and not reaching the completeness limit. Low student math scores could be seen in individual completeness and classical completeness in learning. The average classical completeness for the two-variable linear equation system material still reached 52% with a specified Minimal-Completeness-Criteria value of 75. According to one teacher at MTs N 1 Pesawaran, students' difficulties in solving problems were caused by difficulties in turning story problems into modeling mathematical problems. It was because in solving the problem of the Two-Variable Linear Equation System story problem, students should change changes the Two-Variable Linear Equation System problem first into a mathematical model, then completed the mathematical model and must be returned in its original form. Because learning Mathematics requires reasoning and logic, many students will experience difficulties in Mathematics.

Moreover, many students chose to solve mathematical problems quickly and practically. Usually, students only learned the answers to examples of existing problems and then memorized them without understanding the concept. Besides, the weakness of students was to quote from what the teacher had done on the blackboard. In fact, as the review above, the ability to solve problems is the goal of teaching Mathematics in school. Also, teachers in evaluating the achievement of learning outcomes only emphasized cognitive goals without regard to the dimensions of cognitive processes, especially the level of metacognition. As a result, efforts to introduce metacognition in solving mathematical problems to students were very less or even tended to be ignored. Therefore, one aspect of an interesting dimension of knowledge and skills to be studied more deeply, especially in Mathematics learning, is the aspect of the level of metacognition. Based on this, the researcher wants to describe the level of metacognition of VIII-grade students of MTs N 1 Pesawaran in solving the problem of the problem story in the system of linear equations of two variables.

2. Metacognition

Metacognition was first introduced by John Flavell, a psychologist from Stanford University in 1976. Flavell defines metacognition as student awareness, consideration, and control of his cognitive processes and strategies (Wilson and Clark, 2004) Metacognition has a vital role in learning Mathematics and in solving mathematical problems. Related to this, metacognition is a student's awareness, consideration, and controlling/monitoring of strategies, as well as cognitive processes themselves.

According to Suherman et al (2001), metacognition is a word related to what is known about him as an individual who learns and how he controls and adjusts his behavior (Suherman, 2001). Someone needs to be aware of the advantages and disadvantages they have. Metacognition is a form of the ability to look at oneself so that what he does can be controlled optimally.

Tacccasu defines metacognition as part of planning, monitoring, and evaluating the learning process, as well as, awareness and control of the learning process (Iswahyudi, 2011). In line with this opinion, Kirsh stated that metacognition, especially in the field of education, is related to activities and skills related to planning, monitoring, evaluating, and improving workability (performance). In this study, metacognition was limited to three components, namely planning, monitoring, and reflection. These three components were a series and are interrelated in metacognition activities.

From the explanation above, it can be concluded that metacognition is an awareness of students in using their thinking to plan, consider, control, and assess their cognitive processes and strategies.

3. Metacognition in Mathematics Learning

In research conducted by Goos and Gilbraith on the role of metacognition for students in mathematical problem-solving activities, they investigated the metacognition strategies of middle school students when they solved mathematical problems individually (Goos and Gilbraith, 2000). Students were given a math problem, and they then solve it individually. After students completed these questions, they were then given a questionnaire as instruments to find out the students' metacognition activities. To find out the metacognition activities of students, metacognition self-monitoring instruments were used, which contained metacognition statements.

From the research, it was concluded that students who used their metacological strategies well when solving mathematical problems (problem-solving) had more ability to solve mathematical problems. The student tried to use his metacology to arrange the steps of thinking in solving mathematical problems.

4. Research Methods

In the study, the qualitative research method was adopted based on a case study research design. The participants were determined through purposive sampling model. The participants were three students of VIII class at MTs N 1 Pesawaran. The process of selecting sthe participants started with giving a question about two variables linear equation system to the VIII-class students of MTs N 1 Pesawaran. From the results of the answers to these questions, students were grouped into three groups based on high, medium, and low-value categories. Data collection techniques in this study used interviews based on the material of SPLDV (two variables linear equation system) questions. The instruments used in the study were: (1) problem-solving questions, and (2) interview guidelines.

5. Result and Discussion

Based on the analysis of task-based interview data that has been carried out, the following is a review of the level of metacognition of students in each category.

5.1 Metacognition Level of Subjects with High Value

Subject T

1)   In the planning stage, the subject T performed metacognitive activities: could express problems clearly, knowing the strategies that would be used to solve problems, and could express the use of strategies that would be used in solving problems.

Figure 1. Planning Stage

2) The monitoring stage, subject T performed metacognition activities: could apply a strategy that had been planned well and could do calculations correctly and apply the same strategy to other problems so that they got the right solution.

Figure 2. Monitoring Stage

3) In the examination stage, the subject T performed metacognitive activities: checking the final results of the answers, but not checking all the steps taken, and believing the results they have obtained.

Figure 3. examination stage

Based on the description and appropriateness of indicators above, In the level of reflective use the subject reflect on their thinking before, during, and after solving the problem (Setyadi. 2016). Then can be concluded that the level of metacognition of subjects with the level of metacognition of students in the high-value category is reflective use, with the appearance of metacognition level indicators as follows.

a. The planning stage: can understand the problem and can reveal what is known and what is asked but have doubts in determining the steps that will be used in problem-solving.
b. The monitoring stage: can provide answers, but cannot provide supporting reasons, realize misconceptions (formulas) but cannot correct calculations, and subjects are unsure about their work, to continue the problem-solving step requires angling questions.
c. The examination stage: re-examine or evaluate the results obtained but are not sure of the answers.

T of the high category was the level of reflective use.

5.2 Metacognition Level of Subjects with Medium Value

Subject S

1) In the planning stage, the subject S performed metacognition activities: could understand the problem and could express what was known and what was asked but had doubts in determining the steps that would be used in problem-solving.

Figure 5. planning stage

2) Monitoring stage, subject S performed metacognition activities: could provide answers, but could not provide supporting reasons, realized misconceptions (formulas) but could not correct calculations, and subjects were unsure about their work, to continue the problem-solving step required angling questions.

Figure 6. monitoring stage

3) In the examination stage, the subject S re-examined or evaluated the results obtained but was not sure of the answer.

Based on the explanation and appropriateness of indicators, In the level of strategic use, the subject are conscious to use various strategies to improve their thinking accuracy (Setyadi. 2016). Then it can be concluded that the level of metacognition of subjects with the level of metacognition of students in the medium value category is strategic use, with the appearance of metacognition level indicators as follows.

a. The planning stage: can understand the problem and can reveal what is known and what is asked but have doubts in determining the steps that will be used in problem-solving.
b. The monitoring stage: can provide answers, but cannot provide supporting reasons, realize misconceptions (formulas) but cannot correct calculations and subjects are unsure about their work, to continue the problem-solving step requires angling questions.
c. The examination stage: re-examine or evaluate the results obtained but are not sure of the answers.
S of the medium category was the level of strategic use.

5.3 Level of Metacognition of Subjects with Low Value

Subject R

1) The planning stage, subject R performed metacognitive activities: could understand the problem and could express what was known and what was asked, could not determine the steps that would be used in problem-solving.

2) The monitoring stage, subject R, did the metacognition activity: could not continue working on the questions.

3) In the examination stage, subject R did not evaluate the results obtained.

Based on the explanation and appropriateness of indicators, In the level of aware use, the subject is aware of what they are thinking (Setyadi, 2016). Then it can be concluded that the level of metacognition of subjects with the level of metacognition of students in the low-value category is aware use, with the emergence of metacognition level indicators as follows.

a. The planning stage: can understand the problem and can express what is known and what is asked, but cannot determine the steps that will be used in solving the problem.
b. The monitoring stage: cannot continue working.
c. The examination stage: do not evaluate the results obtained.

R of the low category was the level of aware use.

6. Conclusion

Based on the results of research on the level of metacognition of students of MTs N 1 Pesawaran, t can be obtained the following conclusions:

1.   The level of metacognition of students in the high-value category is reflective use, with the following indicators for the level of metacognition appearing.
a. The planning stage: can express problems clearly, know the ways that will be used to solve problems, and be able to express strategies that will be used in solving problems.
b. The monitoring stage: being aware of misconceptions, and being able to give reasons that support his thinking, being able to apply well-planned strategies, and do calculations correctly.
c. Examination stage: evaluates the results obtained but does not check all the steps taken and believes the results that have been obtained.
2.   The level of metacognition of students in the medium value category is strategic use, with the emergence of indicators of the level of metacognition as follows.
a. The planning stage: can understand the problem and can reveal what is known and what is asked but have doubts in determining the steps that will be used in problem-solving.
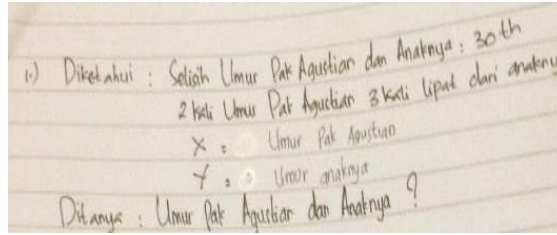b. The monitoring stage: can provide answers, but cannot provide supporting reasons, realize misconceptions (formulas) but cannot correct calculations, and subjects are unsure about their work, to continue the problem-solving step requires angling questions.
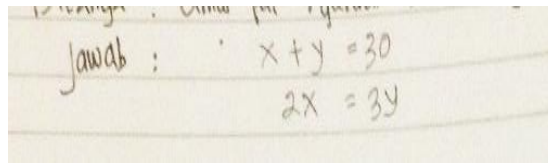c. Examination stage: re-examine or evaluate the results obtained but are not sure of the answers.
3.   The level of metacognition of students in the low-value category is aware use, with the appearance of the metacognition level indicator as follows.
a. The planning stage: can understand the problem and can express what is known and what is asked but cannot determine the steps that will be used in solving the problem.
b. Monitoring stage: cannot continue working.
c. Evaluation stage: do not evaluate the results obtained.

7. Conflict of Interest

The authors declare that there is no conflict of interest.

8. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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AN ADAPTATION OF ARTIFICIAL INTELLIGENCE ANXIETY SCALE INTO TURKISH: RELIABILITY AND VALIDITY STUDY

Research Article

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AN ADAPTATION OF ARTIFICIAL INTELLIGENCE ANXIETY SCALE INTO TURKISH: RELIABILITY AND VALIDITY STUDY[1]

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Abstract

The widespread use of artificial intelligence (AI) has been growing in various fields. AI is defined as human-like automation in place of human beings that can operate many functions based on some level of intelligence. In education, AI offers powerful pedagogical tools that can help enhance instructional quality. Given the inevitable advancements of AI in education, this study aims to investigate teachers' AI anxiety levels based on various demographic factors. For this purpose, the AI Anxiety Scale is adapted into Turkish, which provides a good fit of the model to the data for the construct validity. Moreover, the reliability coefficients of the scale show strong evidence of consistency in teachers' responses to the items. For *sociotechnical blindness* dimension, male and female teachers do not show any significant differences. However, for *learning*, *job replacement*, *AI configuration* dimensions and the total scale, female teachers are more anxious towards AI than male teachers. Moreover, there is no difference observed based on degree levels teachers hold. Additionally, anxiety levels of teachers are not related to teachers' age and years of experience in teaching.

Keywords: anxiety, artificial intelligence, scale adaptation, validity and reliability, teachers

1. Introduction

Nowadays, the widespread use of artificial intelligence (AI) has been growing in various fields such as healthcare, engineering, finance, marketing, banking, agriculture, law, and education. AI is defined as human-like automation in place of human beings that can operate many functions based on some level of intelligence such as responding to questions, coping with emerging issues, figuring out problems, and likewise (Coppin, 2004). For the advantage of operating AI in different sectors, McKinsey Global Institute (MGI) reported that 3 to 14% of workers (i.e., 75 to 375 million people) may need to enhance their abilities and/or switch their professions until 2030 (Manyika et al., 2017). Wang and Siau (2019) also pointed out the expeditious enhancement in AI technology that can replace many professions. This situation forces people to adapt working with AI technologies and products, which will eventually require them to get properly prepared to fulfill relevant employment needs in the future. It is still inevitable that computerization and automation may take over human work due to being largely dependent on AI technologies (Nauman, 2017).

Moreover, people whose contributions to technology have been well-recognized (e.g., Bill Gates, Elon Musk, and Stephen Hawking) also noted that AI could have negative impacts on people and society in unfortunate ways if it gets out of control (Future of Life Institute [FLI],

2015). These concerns have led researchers to study on the perception and adoption of individuals about computer anxiety (e.g. Chuo, Tsai, Lan, & Tsai, 2011; Esterhuyse, Scholtz, & Venter, 2016; Korobili, Togia, & Malliari, 2010; Marcoulides, 1989), mobile computer anxiety (Wang, 2007), Internet anxiety (Chou, 2003), and robot anxiety (Nomura, Suzuki, Kanda, & Kato, 2006; Wu et al., 2014).

Despite varying anxiety levels among people, conventional measurement tools have not been commonly developed to measure anxiety levels of individuals for AI technologies. Anxiety towards AI technologies can occur due to imprecise attitudes towards technological enhancement, bewilderment about autonomy, and sociotechnical blindness (Johnson & Verdicchio, 2017; Wang & Wang, 2019). In other words, "AI anxiety (AIA)" can be expressed as the panic and nervousness due to unknown directions of AI development (Johnson & Verdicchio, 2017).

Because of a need for properly designed tools to measure AIA levels of individuals, Wang and Wang (2019) recently developed an AIA scale with four factors (i.e., sub-dimensions), namely, *learning*, *job replacement*, *sociotechnical blindness*, and *AI configuration*. *Learning* dimension similar to computer-anxiety construct is used to measure how much anxious people are with the learning the applications of AI techniques and products in their career. In the era of technology, learning AI-related technologies is crucial to stay in the profession because employees can be constantly required to fulfill relevant skills. Another dimension is *job replacement* that is used to measure anxiety levels of individuals who can lose their jobs with the development of AI techniques and products. *Sociotechnical blindness* dimension is used to measure anxiety levels of individuals who cannot properly realize that AI can only work with the combination of people and social institutions (Johnson & Verdicchio, 2017). This is a misunderstanding concept that AI technology in the future can operate per se without the involvement of human beings. Last, *AI configuration* dimension similar to robot-anxiety construct can be attributed to anxiety levels of individuals who may think humanoid AI techniques/products are scary and intimidating (Wang & Wang, 2019).

1.1. Artificial Intelligence in Education

Similar to other fields, technological advancements in education have continued to evolve within the last decades. Since the development of microcomputers to personal computers in the 1970s, applications of information and computer-related technologies have been recently increased in various ways in education. AI in education, for instance, can be used in computer aided instruction, global learning, individualized learning, adaptive learning, and enhanced efficiency and effectiveness in educational administration among many other examples (Chen, Chen, & Lin, 2020; Timms, 2016).

The main purpose of using AI in education is to enhance the learning experiences of students in effective and efficient ways. In doing so, cobots, the application of robots helping teachers in a classroom, are being used to adjust learning environments according to students' skills (Timms, 2016). Furthermore, intelligent tutoring systems have different functions that can be carried out for prompt feedback on students' learning experiences and assignments (Mikropoulos & Natsis, 2011; Rus, D'Mello, Hu, & Graesser, 2013). It also offers powerful pedagogical tools that can help enhance instructional quality (Chen et al., 2020). These tools such as simulation-based instructions including various technologies (e.g., virtual reality and 3-D technology) can help students have practical and experimental learning experiences (Mikropoulos & Natsis, 2011; Timms, 2016; Wartman & Combs, 2018). Although it is still inevitable that computerization and automation can take over human work, teachers still play the main role in education. However, teachers and other educational stakeholders can need to

adapt AI technologies and products so that they can get timely prepared to fulfill these types of AI developments in education.

This study has two purposes. The main goal was to adapt the Artificial Intelligence Anxiety Scale (AIAS) into Turkish and investigate validity and reliability properties of the scale. In the second part, it was further aimed to explore whether the AIA levels of teachers differ based on gender, degree levels, age of teachers, and years of experiences in teaching.

2. Method

In this part of the study, information about participants, the data collection instrument, the steps of the scale adaptation, data collection procedure, and data analyses was provided.

2.1. Participants

The data were collected from teachers who were teaching from primary through high school-level students in the academic year of 2019-2020 in Turkey. The purpose of the study was shared with participants who were asked to voluntarily involve in the study by filling out the items through an online survey form. Since each item was required to respond to the next following item, there were no missing data. The distribution of 222 teachers is as follows: 49.1% ($N = 109$) male and 50.9% ($N = 113$) female; 79.7% ($N = 177$) an undergraduate degree, 7.7% ($N = 17$) a master's degree without thesis, 9.9% ($N = 22$) a master's degree with thesis, and 2.7% ($N = 6$) a doctoral degree; the mean of the teachers' age was 33.6, ranging from 22 to 57 years old; the average year of teachers' teaching experience was 9.7, ranging from 1 to 36 years of teaching.

2.2. Data Collection Instrument

The data were obtained using the Artificial Intelligence Anxiety Scale (AIAS; Wang & Wang, 2019), which was adapted into Turkish by the author in this study. Wang and Wang (2019) first adapted 59 items based on numerous studies relevant to AIA. Those 59 items were revised by experts and 9 items were eliminated from the scale because of redundancy. Psychometric properties of the scale were investigated after administering the remaining 50 items to 301 participants. As a result of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) as well as reliability analyses, 21 items with four dimensions (i.e., learning, job replacement, sociotechnical blindness, and AI configuration) were retained, which is reported in Table 1. As implemented in the original scale, the response scale of items was based on a 7-point Likert-type (1 = never through 7 = completely). In the original study, Wang and Wang (2019) reported the reliability of each dimension; .974 for learning (L), .917 for job replacement (JR), .917 for sociotechnical blindness (SB), and .916 for AI configuration (AIC). Furthermore, corrected item-to-total correlation for each item was higher than .40, which was above the critical value of .30 (Nurosis, 1994).

Table 1. *Dimensions of AIAS and corresponding items*

Dimensions	Items
Learning (8 items)	1-8
Job Replacement (6 items)	9-14
Sociotechnical Blindness (4 items)	15-18
AI Configuration (3 items)	19-21

2.3. The Adaptation of the AIAS

Since the main purpose of this study was to adapt the AIAS into Turkish, items in the original scale were first translated by three academicians who have obtained their Ph.D. degrees from English-spoken countries. Second, the consistency of the translated version of the scale was analyzed and reconciled with the translations. Third, the Turkish version of the scale was then translated back into English by another academician who holds a Ph.D. degree from an English-spoken country, which was then compared with the original items. The original and translated items of the AIAS can be seen in Appendix 1.

2.4. Data Collection Procedure

Data were collected through an online survey form. The link of the survey was send to in-service teachers via email and social media platforms. Given the first item asking participants if they would like to voluntarily attend the study, 222 teachers were responded to 11 items about socio-demographic characteristics (e.g., gender, degree levels, age, and years of teaching experience) of participants and 21 items about AIA. Gender and degree levels were treated as categorical variables; whereas, age and years of teaching experience were treated as continuous variables. The "convenience sampling" method was considered for this study. Since the sample size around 10 times the number of items was acceptable (Kline, 2015; Nunnally, 1978), the data collected from 222 teachers suffices for the analyses with the AIAS of 21 items.

2.5. Data Analysis

First of all, no missing data were observed because of the fact that participants cannot proceed to the next following item unless a previous item was responded. Next, data were further investigated based on skewness, kurtosis, and outliers. Moreover, for the sake of the construct validity, the data collected using the AIAS was carried out based on confirmatory factor analysis (CFA) using Mplus 7.0 version (Muthén & Muthén, 2012). Nevertheless, the correlation among the sub-dimensions of the scale and the entire scale as well as the reliability coefficients of the sub-dimensions of the scale and the entire scale in terms of internal consistency were calculated using SPSS version 22.0 (IBM Corp, 2013). Furthermore, after ensuring validity and reliability of the AIAS, anxiety levels of teachers based on gender, degree levels, age of teachers, and years of teaching experience were investigated. In doing so, anxiety levels of teachers based on gender and degree levels were compared by independent sample *t*-test and ANOVA, respectively. Furthermore, whether anxiety levels of teachers are correlated with teachers' age and years of teaching experience was investigated by Pearson correlation coefficients.

3. Results

In this part of the study, the validity and reliability properties of the adapted version of the AIAS were reported. Additionally, after ensuring validity and reliability of the scale, AIA levels of teachers based on socio-demographic factors were provided.

3.1. Validity and Reliability Analyses

CFA was implemented to check how well latent construct can be explained by items of the AIAS (Suhr, 2006) given the dimensions of *learning* (L), *job replacement* (JR), *sociotechnical blindness* (SB), and *AI configuration* (AIC). The diagram for CFA was presented in Figure 1. Although the chi-square value was found significant (χ^2 = 458.268, *df* = 178, *p* < 0.05) given the large number of degrees of freedom, χ^2 / *df* = 2.57 is within the acceptable level between 2 and 3 (Bentler & Hu, 1995). Moreover, other indices such as the Tucker-Lewis index (TLI; Tucker & Lewis, 1973), the comparative fit index (CFI; Bentler, 1990), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR)

were investigated. While the TLI, CFI, and SRMR values of .93, .94, and .069, respectively, showed a good fit of the model to the data, the RMSEA value of .084 displayed an acceptable fit (Bentler & Hu, 1995; Browne & Cudeck, 1993; Kline, 2015).
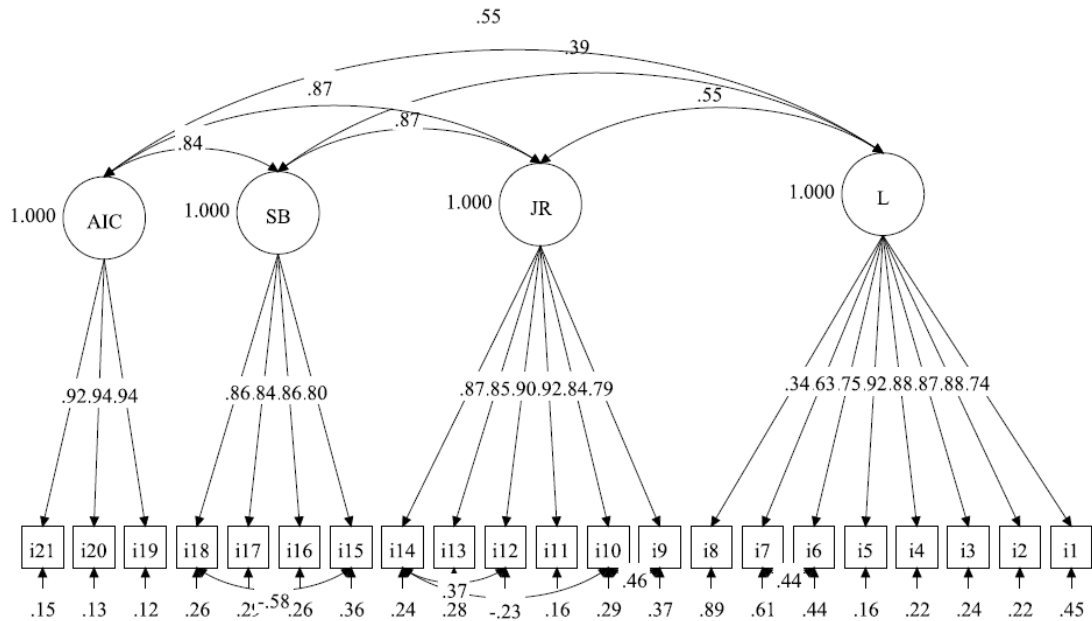
Figure 1. CFA Diagram of the AIAS

Nevertheless, the Cronbach's Alpha reliability coefficient was .96 for the complete scale (21 items), .89 for L (8 items), .95 for JR (6 items), .89 for SB (4 items), and .95 for AIC (3 items) dimensions. As a result, strong evidence of consistency in teachers' responses to the AIAS items was observed.

Table 2. *Means, Standard Deviations, and Correlations of AIAS total score and its sub-dimensions*

	$\overline{X}$	SD	Correlation			
			L	JR	SB	AIC
L	1.98	1.036				
JR	3.47	1.879	0.567			
SB	3.95	1.805	0.442	0.813		
AIC	3.34	1.959	0.554	0.819	0.771	
AIAS	3.18	1.475	0.675	0.939	0.899	0.926

Note. Correlations are significant at the 0.01 level (2-tailed); *N* = 222; L = Learning; JR = Job Replacement; SB = Sociotechnical Blindness; AIC = AI Configuration; AIAS = Artificial Intelligence Anxiety Scale.

Table 2 reports the mean, standard deviation, and correlations of AIAS total score and its sub-dimensions. The mean values were relatively low based on the 7-point Likert-type scale, ranging from 1.98 (*SD* = 1.036) for L to 3.95 (*SD* = 1.805) for SB. The correlations among the sub-dimensions were positive and statistically significant at the 0.001 level, which ranged from

0.442 between L and SB to 0.819 between JR and AIC. These findings show that the scale has a structure compatible with its sub-dimensions. Furthermore, the average score and standard deviations of each item as well as correlations among items were reported in Appendix 2.

Based on the aforementioned findings, anxiety levels of teachers based on gender and degree they hold were compared by independent sample *t*-test and ANOVA, respectively. Furthermore, whether anxiety levels of teachers are correlated with teachers' age and years of teaching experience was explored. Given the medium-sized sample of 222, we retain the null hypothesis of the distribution of normal sample because absolute z-values of skewness and kurtosis are below 3.29 with an alpha level of 0.05 (West, Finch, & Curran, 1995). Thus, we conclude that parametric tests can be used. Moreover, homogeneity of variance (i.e., homoscedasticity) was checked based on Levene's test for ANOVA. The null hypothesis of the equality of variances for variables based on each sub-dimension and the total scale was accepted; therefore, we concluded that the population variances are equal across groups.

Table 3. *Artificial Anxiety Level Comparisons for Each Dimension*

		Learning				
		$\bar{X}$	*SD*	*p*	*Skewness*	*Kurtosis*
	Male	1.76	0.926	0.002	1.196	.806
	Female	2.18	1.098			
		Job Replacement				
		$\bar{X}$	*SD*	*p*	*Skewness*	*Kurtosis*
	Male	3.12	1.779	0.007	.302	-1.096
	Female	3.80	1.919			
		Sociotechnical Blindness				
		$\bar{X}$	*SD*	*p*	*Skewness*	*Kurtosis*
Gender	Male	3.74	1.802	0.084	-.026	-1.087
	Female	4.16	1.791			
		AI Configuration				
		$\bar{X}$	*SD*	*p*	*Skewness*	*Kurtosis*
	Male	3.02	1.986	0.019	.314	-1.167
	Female	3.64	1.892			
		AIAS				
		$\bar{X}$	*SD*	*p*	*Skewness*	*Kurtosis*
	Male	2.91	1.418	0.007	.230	-1.023
	Female	3.44	1.487			

Note. Values of standard error of skewness and kurtosis were .163 and .325, respectively.

Table 3 shows the comparisons of AIA levels of teachers based on gender for each dimension and the entire scale. For sociotechnical blindness dimension, male and female

teachers did not show any significant differences ($\bar{X}_M = 3.74$, $\bar{X}_F = 4.16$; $p = .084$). However, for learning ($\bar{X}_M = 1.76$, $\bar{X}_F = 2.18$; $p = .002$), job replacement ($\bar{X}_M = 3.12$, $\bar{X}_F = 3.80$; $p = .007$), AI configuration ($\bar{X}_M = 3.02$, $\bar{X}_F = 3.64$; $p = .019$) dimensions and the overall AIA scale ($\bar{X}_M = 2.91$, $\bar{X}_F = 3.44$; $p = .007$), female teachers were significantly more anxious towards AI than male teachers. Furthermore, there were no differences in anxiety observed towards AI based on degree levels teachers hold. In other words, ANOVA results showed that teachers' anxiety levels were not different across degree levels (i.e., undergraduate, master without thesis, master with thesis, and doctorate): $F(3, 218) = .37$, $p = .773$ for learning; $F(3, 218) = .75$, $p = .523$ for job replacement; $F(3, 218) = 1.70$, $p = .168$ for sociotechnical blindness; $F(3, 218) = .62$, $p = .603$ for AI configuration; and $F(3, 218) = .97$, $p = .408$ for the AIA total score.

Moreover, whether anxiety levels of teachers were correlated with ages and years of teaching experience was carried out by Pearson correlation coefficients based on each dimension and overall scale of AIA. Results reported in Table 4 showed that the anxiety levels of teachers are not correlated with age and years of experience (i.e., $p > .05$). That is, the anxiety levels of teachers based on AIAS total score and its sub-dimensions did not differ in any directions across ages and years of teaching experience.

Table 4. *Pearson Correlations*

		L	JR	SB	AIC	AIAS
Age	R	.099	-.003	.073	.036	.051
	p	.143	.969	.278	.596	.450
Experience	R	.120	.003	.077	.034	.057
	p	.075	.965	.253	.616	.398

Note. R is the Pearson Correlation; p is the significance level.

4. Discussion and Conclusion

Artificial intelligence (AI) is human-like automation that can operate many functions based on some level of intelligence (Coppin, 2004), which brings many advantages to various sectors (e.g., healthcare, engineering, finance, agriculture, law, and education). AI technology has been also used in the classroom for learning purposes (Luckin, Holmes, Griffiths, & Forcier, 2016). For instance, computer aided instruction, personalized learning, and enhanced efficiency and effectiveness in educational administration are among many other applications of AI in education (Chen et al., 2020; Timms, 2016). The main purpose of using AI in education is to enhance the learning experiences of students in effective and efficient ways. Although it is still inevitable that AI technology can take over human work (Wang & Siau, 2019), teachers have irreplaceable roles in education. However, teachers and other educational stakeholders still should be timely prepared for AI developments in education.

Nevertheless, this situation makes individuals nervous and anxious because they need to adjust themselves to the changing world with AI technologies. AI anxiety (AIA) can be defined as the panic and nervousness due to unknown directions of AI technologies and products (Johnson & Verdicchio, 2017). Despite varying anxiety levels among people, Wang and Wang (2019) recently developed an AIA scale with four sub-dimensions; *learning*, *job replacement*, *sociotechnical blindness*, and *AI configuration*. Therefore, the main purpose of this study was

to adapt the Artificial Intelligence Anxiety Scale (AIAS) into Turkish and analyze its validity and reliability properties based on data collected from in-service teachers. The adapted version of the AIAS was investigated for the construct validity based on CFA that provided a good fit of the model to the data. Moreover, the reliability coefficients of the dimensions of the AIAS in terms of internal consistency showed strong evidence of consistency in teachers' responses to the AIAS items.

Furthermore, after ensuring validity and reliability of the scale, anxiety levels of teachers based on gender, degree levels, age, and years of teaching experience were compared in terms of each sub-dimension and the total AIAS score. For sociotechnical blindness dimension, male and female teachers did not show any significant differences. It is important to note that both in-service and prospective teachers should acquire fundamental skills and knowledge in technology for effective teaching (Hofer & Swan, 2008) regardless of gender differences. For instance, Terzi stated that when prospective teachers have higher competency in techno-pedagogy, they can build more effective learning atmosphere for students because of the fact that they believe they can properly design the instructional process (2020). However, for learning, job replacement, AI configuration dimensions and the overall AIA scale, female teachers were significantly more anxious towards AI than male teachers. These findings suggest that teachers, especially female teachers, need training with AI technologies and products so that they can feel more confident to adapt themselves to the changing requirements of the age. It is a crucial duity for teachers to prepare students with the strength and power of AI that can let them disclose and develop their abilities in this changing labor (Luckin et al., 2016). Moreover, there were no differences observed in anxiety levels of teachers towards AI based on degree levels they hold. Additionally, anxiety levels of teachers were not related to teachers' age and years of experience in teaching. Thus, regardless of degree levels, teachers' age, and years of teaching experience, teachers should be provided with appropriate training on AI technologies to be used in a classroom. For instance, the application of robots (i.e., cobots) can be applied to adjust learning environments based on students' skills (Timms, 2016). Furthermore, intelligent tutoring systems can be carried out for prompt feedback on students' learning experiences and assignments (Mikropoulos & Natsis, 2011; Rus, D'Mello, Hu, & Graesser, 2013). Powerful pedagogical tools such as simulation-based instructions including various technologies (e.g., virtual reality and 3-D technology) can also offer practical and experimental learning experiences (Chen et al., 2020; Mikropoulos & Natsis, 2011; Timms, 2016; Wartman & Combs, 2018). It is crucial to note that although computerization and automation can somewhat take over human work, teachers still play the main role in education. However, teachers and other educational stakeholders still need to adapt AI technologies and products so that they can get timely prepared to fulfill these types of AI developments in education.

There were some limitations with this study. First, since the scale was originally developed to measure the general public anxiety toward AI development, it would be necessary to develop a new scale to measure anxiety levels of teachers. Second, the data using the AIAS were obtained based on the self-assessment of teachers that can be potentially affected by their subjective ideas and perceptions. Thus, the results of this study should be interpreted with caution. In the future, findings based on the data obtained from the AIAS can be further verified with more teachers as well as pre-service teachers.

5. Conflict of Interest

The author confirms that there is no conflict of interest.

6. Ethics Committee Approval

Ethics committee approval was received from Harran University (No: 76244175-E.20907)

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Appendix 1.

		Orginal Items	**Translated Items (Turkish)**
Learning	1	Learning to understand all of the special functions associated with an AI technique/product makes me anxious.	Bir YZ tekniğiyle/ürünüyle ilişkili tüm özel işlevleri anlamayı öğrenmek beni endişelendiriyor.
	2	Learning to use AI techniques/products makes me anxious.	YZ tekniklerini/ürünlerini kullanmayı öğrenmek beni endişelendiriyor.
	3	Learning to use specific functions of an AI technique/product makes me anxious.	Bir YZ tekniğinin/ürününün belirli işlevlerini kullanmayı öğrenmek beni endişelendiriyor.
	4	Learning how an AI technique/product works makes me anxious.	Bir YZ tekniğinin nasıl çalıştığını (veya ürününün ne işe yaradığını) öğrenmek beni endişelendiriyor.
	5	Learning to interact with an AI technique/product makes me anxious.	Bir YZ tekniği/ürünü ile etkileşim kurmayı öğrenmek beni endişelendiriyor.
	6	Taking a class about the development of AI techniques/products makes me anxious.	YZ tekniklerinin/ürünlerinin geliştirilmesi hakkında ders almak beni endişelendiriyor.
	7	Reading an AI technique/product manual makes me anxious.	Bir YZ tekniğinin/ürününün kılavuzunu okumak beni endişelendiriyor.
	8	Being unable to keep up with the advances associated with AI techniques/products makes me anxious.	YZ teknikleriyle/ürünleriyle ilişkili gelişmelere ayak uyduramamak beni endişelendiriyor.
	9	I am afraid that an AI technique/product may make us dependent.	Bir YZ tekniğinin/ürününün bizi bağımlı kılabileceğinden korkuyorum.
Job Replacement	10	I am afraid that an AI technique/product may make us even lazier.	Bir YZ tekniğinin/ürününün bizi daha da tembelleştirebileceğinden korkuyorum.
	11	I am afraid that an AI technique/product may replace humans.	Bir YZ tekniğinin/ürününün insanların yerini alabileceğinden korkuyorum.
	12	I am afraid that widespread use of humanoid robots will take jobs away from people.	İnsansı robotların yaygın kullanımının, insanların işlerini elinden alacağından korkuyorum.
	13	I am afraid that if I begin to use AI techniques/products I will become dependent upon them and lose some of my reasoning skills.	YZ tekniklerini/ürünlerini kullanmaya başlarsam onlara bağımlı olacağımdan ve akıl yürütme becerilerimi kaybedeceğimden korkuyorum.
	14	I am afraid that AI techniques/products will replace someone's job.	YZ tekniklerinin/ürünlerinin kişilerin işlerini elinden alacağından korkuyorum.

Appendix 1 (Cont.).

		Orginal Items	Translated Items (Turkish)
Sociotechnical Blindness	15	I am afraid that an AI technique/product may be misused.	Bir YZ tekniğinin/ürününün kötü amaçlı kullanılabileceğinden korkuyorum.
	16	I am afraid of various problems potentially associated with an AI technique/product.	Bir YZ tekniğiyle/ürünüyle potansiyel olarak ilişkili çeşitli sorunlardan korkuyorum.
	17	I am afraid that an AI technique/product may get out of control and malfunction.	Bir YZ tekniğinin/ürününün kontrolden çıkabilir ve arızalanabilir olacağından korkuyorum.
	18	I am afraid that an AI technique/product may lead to robot autonomy.	Bir YZ tekniğinin/ürününün robot özerkliğine yol açabileceğinden korkuyorum.
AI Configuration	19	I find humanoid AI techniques/products (e.g. humanoid robots) scary.	İnsansı YZ tekniklerini/ürünlerini (örneğin insansı robotları) ürkütücü buluyorum.
	20	I find humanoid AI techniques/products (e.g. humanoid robots) intimidating.	İnsansı YZ tekniklerini/ürünlerini (örneğin insansı robotları) tehditkar buluyorum.
	21	I don't know why, but humanoid AI techniques/products (e.g. humanoid robots) scare me.	Nedenini bilmiyorum, fakat insansı YZ teknikler/ürünler (örneğin insansı robotlar) beni korkutuyor.

Appendix 2. *Means, Standard Deviations, and Correlations of each item*

	$\bar{X}$	SD	i1	i2	i3	i4	i5	i6	i7	i8	i9	i10	i11	i12	i13	i14	i15	i16	i17	i18	i19	i20
i1	2.04	1.44																				
i2	1.81	1.24	.733**																			
i3	1.80	1.26	.608**	.762**																		
i4	1.76	1.26	.615**	.750**	.823**																	
i5	1.88	1.28	.674**	.795**	.783**	.831**																
i6	1.61	1.12	.532**	.715**	.647**	.592**	.708**															
i7	1.66	1.14	.475**	.582**	.548**	.511**	.577**	.698**														
i8	3.24	2.03	.255**	.293**	.321**	.282**	.289**	.225**	.268**													
i9	3.10	2.05	.425**	.381**	.421**	.354**	.477**	.363**	.312**	.464**												
i10	3.56	2.14	.414**	.375**	.381**	.347**	.448**	.309**	.296**	.425**	.826**											
i11	3.45	2.16	.421**	.434**	.452**	.409**	.495**	.352**	.307**	.353**	.711**	.778**										
i12	3.87	2.13	.366**	.378**	.367**	.327**	.424**	.271**	.291**	.369**	.689**	.742**	.842**									
i13	3.09	2.09	.483**	.451**	.476**	.439**	.524**	.409**	.341**	.382**	.732**	.710**	.754**	.731**								
i14	3.72	2.10	.348**	.369**	.387**	.351**	.403**	.273**	.268**	.367**	.654**	.655**	.813**	.863**	.756**							
i15	4.83	2.08	.182**	.185**	.185**	.162*	.221**	.112	.119	.453**	.549**	.613**	.565**	.647**	.490**	.626**						
i16	3.82	1.98	.344**	.329**	.337**	.296**	.400**	.273**	.215**	.410**	.645**	.650**	.662**	.679**	.664**	.668**	.751**					
i17	3.71	2.08	.316**	.311**	.289**	.213**	.317**	.289**	.283**	.357**	.606**	.639**	.608**	.643**	.625**	.579**	.645**	.783**				
i18	3.44	2.14	.321**	.336**	.313**	.261**	.378**	.328**	.306**	.353**	.624**	.609**	.694**	.671**	.707**	.662**	.504**	.669**	.727**			
i19	3.35	2.05	.407**	.455**	.456**	.431**	.512**	.341**	.370**	.367**	.603**	.661**	.737**	.734**	.680**	.668**	.560**	.626**	.611**	.731**		
i20	3.42	2.07	.385**	.411**	.402**	.380**	.475**	.326**	.348**	.339**	.636**	.665**	.734**	.742**	.668**	.694**	.558**	.626**	.634**	.773**	.884**	
i21	3.24	2.04	.438**	.490**	.447**	.398**	.497**	.422**	.363**	.362**	.657**	.663**	.762**	.741**	.747**	.727**	.515**	.619**	.644**	.782**	.859**	.856**

Notes. ** indicates significant correlations at the 0.01 level (2-tailed); * indicates significant correlations at the 0.05 level (2-tailed).

THEORETICAL BASES OF "SOCIAL-EMOTIONAL LEARNING INTERVENTION PROGRAMS" FOR PRESCHOOL CHILDREN

Review study

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THEORETICAL BASES OF "SOCIAL-EMOTIONAL LEARNING INTERVENTION PROGRAMS" FOR PRESCHOOL CHILDREN

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Abstract

From the point of view that every child is unique and valuable, the need for developing their skills and abilities, and their need for learning and development, in the context of their learning styles/developmental characteristics, must be supported. Because of social-emotional learning skills are comprehensive and very important skills, teaching of these skills requires specific methods and strategies. Social-emotional learning intervention programs can be developed on the basis of various theories. The aim of this review is to evaluate the theoretical bases of social-emotional learning intervention programs for preschool children. The available five social-emotional learning intervention programs used for preschool age children are explained by basic theories. These programs are; "You Can Do It! Education", "The Tools of the Mind", "Conscious Discipline: Building Resilient Classrooms", "INSIGHTS" and "Social Skills in Pictures, Stories, and Songs". Results of the current review showed that "You Can Do It! Education" stands on cognitive-behavioral theory, while "The Tools of the Mind" is based on cultural-historical theory as well as "Conscious Discipline: Building Resilient Classrooms" stands on brain-theory. Meanwhile, "INSIGHTS" is based on temperament theory, and "Social Skills in Pictures, Stories, and Songs" is based on multisensory theory. It was underlined that these intervention programs are highly important for developing social-emotional learning in preschool children. It should be considered whether the theories of these intervention programs are usable for the target skills. Effects of social-emotional learning intervention programs based on different theories can be comparatively examined in future studies.

Keywords: Theory of development and learning, SEL programs, You Can Do It!, The Tools of the Mind, Conscious Discipline, INSIGHTS, Social Skills in Pictures, Stories, and Songs.

1. Introduction

All development areas of developmental characteristics, including cognitive, social, language, emotional, and physical areas, interweave simultaneously. The ability of the children to establish relations with other people is dependent on a series of developmental skills and understanding. For example, following the rules in the setting, waiting to take a turn are the skills related to children's social development, while having confidence to approach their peers, expressing empathy to their peers are the skills related to children's emotional development. Furthermore, remembering names of other children, developing alternating strategies for how to resolve any conflict occurring during a game are the skills based on cognitive development. Using words to explain how to play a game, answering with proper opinions to the questions

from a likely peer are the skills based on language development, while having the necessary motor skills to play a game are skills that refers to physical development (Kostelnik, Whiren, Soderman, & Gregory, 2009). Several social-emotional problems can also appear to be in consequence of disturbance in other areas. Social interactions are affected when children have problems in communication skills. Poor motor performance and communication, and language disorders can also hinder the ability for interactive play, in cases where some children withdraw while others may become aggressive (Gold, 1992). As such, children need to develop their skills and behaviors based on different developmental areas for life success. Social-emotional learning skills are comprehensive skills that have an important role on various points.

Children need the basic skills of social-emotional learning especially in order to be capable of benefiting from their social legacy and biological equipment. Social-emotional learning competence means that a person can understand, express, and manage the emotional and social sides of his/her life in such manners that allow managing the tasks of the life successfully, such as starting relationships, learning, adapting to complex demands arising from development and growth, and solving everyday problems. Social-emotional learning education helps children develop attitudes and behaviors to become socially, emotionally and academically competence. Social-emotional learning education also aims at teaching children to be good citizens having positive values (Elias et. al., 1997). In other words, social-emotional learning is the capacity to establish relationships with other individuals appropriately, solve problems effectively, handle challenging situations capably, and express negative emotions intelligently. It is possible to state that the target of social-emotional learning is a combination of emotions, cognitions, and behaviors. As stated by Epstein (2009), in the first five years of life, in which the type of the grown-up person a child will become is shaped, one of the major developmental tasks is acquisition of social-emotional skills.

Children's learning occurs in diverse ways based on different theoretical orientations. While social-emotional learning intervention programs are necessary in the process, the theories upon which these programs are based determine the contents of the social-emotional learning intervention. Kostelnik, Soderman, & Whiren (2004) emphasized that teaching strategies are important to consider when planning activities. It is also possible that various strategies are encountered through intervention programs based on different theories. In the literature, there are limited number of studies (e.g., Bierman & Motamedi, 2015; Clarke, Morreale, Field, Hussein, & Barry, 2015; Powell & Dunlap, 2009) that investigated the purpose, population, contents and effects of several social-emotional learning intervention programs. It is prominently seen that theories of all social-emotional learning intervention programs either were not handled or were summarized briefly. Another importance of this study is that it is focused on preschool years that are critically important for developing social-emotional learning skills. In this framework, the starting point of present review is to provide information related to social-emotional learning intervention for professionals, practitioners/teachers, researchers, and even families with the context of the ways of the intervention, useful strategies and examples of different theories.

1. 1. Purpose of Current Review

The main purpose of this review is to evaluate the theoretical bases of social-emotional learning (SEL) intervention programs for preschool children. In accordance with this purpose, the available five social-emotional learning intervention programs for preschool children were explained with their based theories. These are as follows: (1)*"You Can Do It! Education",*

(2)*"The Tools of the Mind",* (3)*"Conscious Discipline: Building Resilient Classrooms",* (4)*"INSIGHTS"* and (5)*"Social Skills in Pictures, Stories, and Songs".*

2. Review Procedures

This study, conducted as a literature review, was based on intervention programs, which were specified for developing social-emotional learning for children in preschool period. Based on the purpose of this study, field resources including books, refereed journal articles, and conference proceedings were reviewed. Accordingly, literature research were carried out by keyword-based searches such as "social-emotional learning", "social-emotional programs", "intervention programs for social-emotional learning", "intervention programs for preschool children" and "SEL programs for preschool". In this scope, the social-emotional learning programs that are not called intervention programs ("Al's Pals:Kids Making Healthy Choices"- Wingspan, 1999; "DARE to be You"-Miller-Heyl, MacPhee, & Fritz, 1998; "The Second Step"-Committee for Children, 1989, 2002 etc.) and not intended for preschool children (e.g, "Positive Attitude"-Coelho, & Figueira, 2011; "Strong Teens"-Merrell et. al., 2007) were eliminated from the review process. The available social-emotional learning intervention programs, called intervention programs for preschool children, were examined in detail and the information obtained is presented in an order.

3. Findings on Theoretical Bases of Social-Emotional Learning Intervention Programs for Preschool Children

The theoretical bases of five social-emotional learning intervention programs for preschool children were examined in this study. Table 1 summarizes the information about examined five SEL intervention programs.

Table 1. *Information about theoretical foundations of social-emotional learning intervention programs for preschool children examined in the study*

The name of the SEL intervention programs	Developer of the SEL intervention programs	Theoretical basis of the SEL intervention programs
You Can Do It! Education	Ashdown, & Bernard (2012)	Cognitive-behavioral theory
The Tools of the Mind	Bodrova, & Leong (1996, 2007)	Cultural-historical theory
Conscious Discipline: Building Resilient Classrooms	Bailey (2001)	Brain-theory
INSIGHTS	McClowry, Snow, Tamis-LeMonda, & Rodriguez (2010)	Temperament theory
Social Skills in Pictures, Stories, and Songs	Serna, L., Nielsen, E., & Forness, S. (2007)	Multisensory theory

*Information on the source of the program with the developer can be seen in the references in detail.

As seen in the Table 1, the reviews showed that social-emotional learning intervention programs for preschool children can have different theoretical basis, and can be developed through disparate perspectives. The information within the scope of the findings, obtained depending the purpose of the study, were presented below in detail.

3.1. An Overview of the SEL Intervention Program Entitled "You Can Do It! Education"

"You Can Do It! Education" is a program based on several *cognitive-behavioral, educational, and social learning theories*, including the theories by Vygotsky, Ellis, Bandura, and Seligman (Ashdown, & Bernard, 2012) that collectively emphasize the position of self-talk and thinking exhibited by children on their behaviors and emotions. However, *You Can Do It! Education* program specifically bases on *cognitive-behavioral theory* to teach social-emotional skills and competencies.

Cognitive development theories focus on intellectual growth and emphasize attainment of increasingly more effective thought structures from birth to old ages. This theory considers seeing, hearing, touching, smelling, tasting, analyzing, synthesizing and receiving feedback from the environment (Peters, Neisworth, & Yawkey, 1985). Behavioral theories focus on objective, observable principles that influence human behavior (Catron & Allen, 1993). Accordingly, cognitive-behavioral theory aims at addressing the interactions between how children think, feel and behave. There is generally a time limitation in the theory (e.g., 10-20 sessions) and it concentrates on current problems and respects a structured style of intervention. As stated by this theory, emotional experiences are influenced by children's thoughts and behaviors. This approach asserts that mental health problems arise when children exhibit maladaptive and extreme patterns of thinking and behavior (Julian, & Querée, 2007). Cognitive behavioral theory mediates determination of a behavior exhibited by a person against any environmental event (Gresham, 2018). In other words, cognitive-behavioral theory is a structured approach to assist children in resolving their problem behaviors and maladaptive emotions by supporting their thinking forms or cognitions. The intervention programs based on cognitive-behavioral theory is likely to involve the cognitive, emotional, or behavioral processes. As emphasized by Gresham (2018), social-emotional learning intervention based on cognitive behavioral theory presents children with social situations that have various internal and external special cues. Cognitive-behavioral social-emotional learning interventions include strategies such as self-evaluations, social problem solving, self-instruction and self-monitoring. Bernard (2008) stated that the *You Can Do It!* cognitive-behavioral emotional intervention is eligible to teach children how to identify and challenge their irrational thinking and change it into a more rational self-talk.

A curriculum-based program "*You Can Do It! Education*" was developed by Bernard (2004a). The theoretical framework of *You Can Do It!* incorporates three distinct types of social-emotional areas: (a) learning dispositions, (b) social skills, and (c) emotional resilience. The overarching perspective of this program is that children can acquire positive social-emotional, behavioral and achievement outcomes by focusing on five key social-emotional competencies: emotional resilience, persistence, getting along, organization, and confidence. These competencies are supported by teaching the 12 specific ways of thinking (called "habits of the mind"). These so-called positive "habits of the mind" help develop children's confidence (*being independent, taking risks, accepting myself, I can do it*), persistence (*giving effort, I can do it, working tough), organization (planning my time, setting goals*), getting along (*thinking first, playing by the rules, being tolerant of others, and being socially responsible*) and emotional resilience (*I can do it, I can stand it, being tolerant of others, accepting myself, it's not the end of the world, being independent, working tough, taking risks)* competences taught in *You Can Do It!* (Bernard, 2012). A curriculum-based "*You Can Do It! Early Childhood Education Program*" was created for the use of teachers towards children at the ages of four - seven (Bernard, 2004a) for the purpose of providing young children with skills and competencies emphasized by "*You Can Do It*!".

"*You Can Do It! Early Childhood Education Program*" includes a great amount of structured and explicit lessons to teach young children the five foundational skills and the twelve positive "habits of the mind". Activities are incorporated in the program that assists teacher in encouraging social-emotional skills of children in a number of ways. There are role-play activities in majority of the lessons, and most of the lessons require a high involvement of teachers in utilizing five puppets (named Ricky Resilience, Oscar Organization, Pete Persistence, Connie Confidence, and Gabby Get Along) for transmitting crucial messages. Moreover, the program provides teachers with a structured presentation format in order to introduce the essentials of the *You Can Do It!* Program to parents, including the five foundational skills in a 15-20-minute introductory session. Additionally, the program includes three sessions for informing parents, where teachers may give recommendation to parents on what they can practice at home for supporting the subjects instructed in the *You Can Do It!* Program (Bernard, 2004b; Bernard, 2004c; Bernard, 2012). It was highlighted as a result of the research conducted by Ashdown, & Bernard (2012) that there was a statistically significant positive impact of the "*You Can Do It! Early Childhood Education Program*" on the levels of social-emotional competence and well-being for the preparatory and first-grade children, as well as a decrease in problem behaviors including the problems of externalizing, internalizing, and hyperactivity in the first-grade children.

3.2. An Overview of the SEL Intervention Program Entitled "The Tools of the Mind"

"The Tools of the Mind" is another social-emotional learning intervention program based on the *cultural-historical theory* of development. Cultural-historical theory, called the Lev Vygotsky's theory, is related to a consideration of social development. In addition to this, Vygotsky's theory focuses primarily on the role of nurture, and particularly on the ways where the development of a child is fostered by the social and cultural environments of that child (McDevitt, & Ormrod, 2004). Vygotsky's theory emphasizes humans' psychological functioning with mental tools (such as spoken and written language, number systems, and models). The psychological connection of humans to the world is particularly influenced by the intervention of these mental tools (Hedegaard, 2004). Vygotsky emphasized that more experienced peers and adults have a role in accessing the information on culture, and on the expectations and social skills. Within the context of this theory, which underlines their importance on socialization of children into a larger society, the role of the teachers is especially significant (Essa, 2003). Vygotsky's theory of development and learning forms a basis for many practices such as mentoring, collaboration, coaching, cooperative learning, joint problem solving, and other forms of assisted learning. In addition to this, Vygotsky states that social interactions that occur by means of play is essentially required for development of children. Vygotsky asserted that social interactions with others ensure children to learn social skills such as collaboration and cooperation, which enhance and nurture their cognitive skills. (Morrison, 2006).

The program called *The Tools of the Mind* is a comprehensive early childhood curriculum for kindergarten and preschool age children, designed by Bodrova, & Leong (1996, 2007). This program focuses on building introduction skills in social-emotional competence, literacy, and mathematics by using specific activities that promote self-regulation. This curriculum is based on Vygotskian activities that extend the behavior repertoire of children and produce new opportunities for children to utilize existing social-emotional behaviors. The *Tools of the Mind* curriculum states that every child can develop their cognitive, social and emotional skills that are required for them to achieve the highest potential they can do, as long as the necessary

conditions are provided. *Tools of the Mind* includes many activities, especially focusing on self-regulation such as make-believe play sessions, productive activities, the freeze game, buddy reading, learning plans, the numerals game, games with rules, story discussions, and scaffold writing. In *Tools*, the role of the teacher is to support children in using tools and learning how to use tools so as to facilitate their learning, rather than only to teach them skills. The theoretical basis of this program indicates that there are three elements: teacher regulates children in classroom, children regulate the other children, and children learn to self-regulate (Bodrova & Leong, 1996, 2007; Bodrova & Leong, 2009).

Barnett et. al. (2008) investigated the influence of the *Tools of the Mind* curriculum on improving the education of children who were three-four years old. It was concluded in the study that the aim of the *Tools of the Mind* program is to assist children's development and learning in order to enhance their social and academic achievements. A study conducted recently by Blair, McKinnon, & Daneri (2018) evaluated the impact of the *Tools of the Mind* program on social-emotional competence of kindergarten and first grade children. The results indicated that the *Tools of the Mind* program was effective in increasing kindergarten children's self-regulation, social-emotional competence and positive relationships with teachers, as well as in decreasing aggression, conduct problems, and emotional symptoms. Similarly, Solomon et. al. (2018) found that preschool children who received the *Tools of Mind* program made greater gains on self-regulation.

3.3. An Overview of the SEL Intervention Program Entitled "Conscious Discipline: Building Resilient Classrooms"

The *"Conscious Discipline: Building Resilient Classrooms"* is a social-emotional learning program based on the *brain-based research theory*. The field of neuroscience has contributed to brain researches. The research based on brain-based approach is especially important in the early childhood education. Brain research gives a great deal of importance on stimulation and development of specific areas in brain. For instance, brain research revealed that the areas of brain associated with spatial reasoning and mathematics are stimulated by listening to music and learning to play musical instruments at young ages. It is also emphasized by the brain research that daily schedule of a child should include physical education and gross motor activities (Morrison, 2006). The result of the study by Duman (2010) indicated that brain-based learning approach was more effective in increasing achievement of students, compared to the traditional approach. It is critically important that brain-based programs give opportunities to children to get involved in activities, which are developed the different development areas. It should be known that social-emotional learning activities through *Conscious Discipline* do not include rewards and punishment. However, *Conscious Discipline* supports intrinsic motivation, altruism and prosocial behavior by way of mindfulness (Zastrow & Simonis, 2005).

The early childhood program titled as *Conscious Discipline* combines classroom management and social-emotional learning, and addresses both adults and children. *Conscious Discipline* strives to develop social-emotional learning skills of preschool children by first developing the internal states and skill sets of adults, and then subsequently encouraging the adult to teach such skills to children and model them with children. *Conscious Discipline* means supporting inner motivation, prosocial behavior and altruism by raising awareness (Bailey, 2001, 2015).

Conscious Discipline, a trauma-informed and evidence-based program, combines all learning domains, such as social-emotional, cultural, and physical domains, as well as cognitive domain. The program includes seven skills that are required change everyday discipline issues into moments of teaching. These are: (1) composure, (2) encouragement, (3) assertiveness, (4) choices, (5) empathy, (6) positive intent and (7) consequences. In addition, the program includes seven powers that empower adults in becoming self-regulating and conscious, responsive and adapted to the needs of themselves and children. It is possible to list the seven powers included in the program as; (1) power of perception (to take responsibility of upset situation), (2) power of unity (to perceive and offer compassion), (3) power of attention (to create images of expected behavior in children's brain), (4) power of free will (to learn to change), (5) power of acceptance (to learn to respond), (6) power of love (to see the best) and (7) power of intention (Bailey, 2001).

Chavez (2014) evaluated the effects of the *Conscious Discipline* program that are observed on social-emotional learning processes of three to four years old children. The results of the said research revealed that the *Conscious Discipline* program was effective in increasing social-emotional learning behaviors, increasing enjoyment in teaching, providing a more positive classroom climate, and reducing aggressive behaviors. Another study by Sorell (2013) examined the practice of the *Conscious Discipline* program for teachers from kindergarten to third grade. According to the findings reported by teachers, it was revealed that the *Conscious Discipline* program was effective on various management skills and strategies of children positively, as well as it supported their emotional development. Additionally, as a result of the study, it was emphasized that *Conscious Discipline* improved teacher's perceptions of management skills and decreased time and frequency of children misbehaviors.

3.4. An Overview of the SEL Intervention Program Entitled "INSIGHTS"

Another social-emotional learning program called "*INSIGHTS*" is based on *temperament theory*. The definition of temperament is the constant style of reaction exhibited by an individual across a number of settings, especially against stress or change. Temperament indicates the fundamental aspects of personality, which are based on biology and which do not explain discrete differences in the universal dynamics, but does it in the developmental process. In other words, temperament acts as an instrument to explain how individuals contribute to their own development in a certain environmental context. According to the temperament theory, an agreement between persons and their environment is possible by means of bidirectional interaction among temperamental, inborn attributes and external circumstances, supports, and demands. The main purpose of this theory is to arise an understanding for how and why children behave differently in their responses to school (McClowry, 2014; Teglasi, 1995). Social-emotional learning intervention based on temperament theory contributes to enhancing the correlation between the environment and temperament of children. Intervention does not target temperament, but environment is changed to respond to the temperament of the child properly. It is emphasized that the strategies of responsive teaching and parenting are practiced to support children in order to satisfy the environmental expectations (McCormick, O'Connor, Cappella & McClowry, 2015a). The key point of the temperament theory is that it gives an appropriate matching opportunity between the temperament of children and the opportunities, expectations, demands, and demands of the environment.

INSIGHTS is a comprehensive social and behavioral intervention program that was developed by McClowry, Snow, Tamis-LeMonda, & Rodriguez (2010). The *INSIGHTS* intervention program emphasizes a temperament frame of reference for parents and teachers to

facilitate the individual social-emotional development of children. This program also assists teachers and parents in recognizing temperament of a child and responding with discipline strategies that contribute to social-emotional development. The curriculum contains several sessions for teacher and parent programs. Two-hour facilitated sessions are organized to last 10 week and all of the parents and teachers are invited to attend these sessions, which are based on a structured curriculum. All of the students participating in classrooms are delivered a classroom program in lessons lasting 45 minutes throughout this period of 10 weeks. The curriculum includes materials such as puppets, videotaped vignettes, flash cards, and workbooks (O'Connor, Cappella, McCormick, & McClowry, 2014). As a principle of the program; children, parents, and teachers participate in every session of the *INSIGHTS* program separately.

In addition, the curriculum has three parts for teacher and parent programs. In *Part I, "The 3 Rs of Child Management: Recognize, Reframe, and Respond"* is instructed to participants in order to apprehend some qualities exhibited by children as an expression of their temperament. Participants apprehend that most of the responds to the specific conditions are associated with the temperament of a child, which results in a decrease in the idea that misbehaviors are exhibited by the child consciously. Participants are suggested the understanding that there are challenges and strengths in every temperament, encouraging them to reshape their perceptions. Participants are taught also that even though temperament is not appropriate for change, responses of teacher and parent may change children's behaviors. In *Part II, "Gaining Compliance,"* the strategies named as temperament-based management strategies are practiced to enhance behaviors of children. Assistance is given to teachers and parents to replace negative interaction patterns with child management strategies. In addition, *Part III* concentrates on strategies that encourage children to become more socially competent, especially when they encounter challenging cases (McCormick, Cappella, O'Connor, & McClowry, 2015b). Within this framework, the *INSIGHTS* intervention program promotes academic development of children, empowering their social-emotional learning behaviors. As such, *INSIGHTS* can be viewed as a preventive school-based intervention program. A study (McCormick et. al., 2015b) by using the *INSIGHTS* program on kindergarten and first-grade children showed that it improved reading and math achievement of low-income children. O'Connor et. al. (2014) conducted another study that showed a positive effect of the *INSIGHTS* program on reading and mathematics achievement of low-income children, as well as on their attention skills, while indicating reductions in disruptive behaviors exhibited by these children.

3.5. An Overview of the SEL Intervention Program Entitled "Social Skills in Pictures, Stories, and Songs"

"Social Skills in Pictures, Stories, and Songs" is a social-emotional learning intervention program based on the comprehensive *multisensory theory.* Further, another explanation of the multisensory approach can be indicated as visual-auditory-kinesthetic-tactile (VAKT) learning styles. This approach asserts that once information is presented in different methods, children learn better (Mercer, & Mercer, 1993). In other words, multiple sensory learning is a learning process that is achieved using visual, auditory, and kinesthetic (even olfactory and/or taste) methods. The literature supports the use of multisensory teaching techniques especially from kindergarten through elementary grade (Rains, Kelly, & Durham, 2008). As stated by Serna, Nielsen, & Forness (2007), social-emotional learning program based on multisensory approach gives children the advantage of learning social-emotional learning by different ways. Pictures, stories, and songs offer both well-known chances to involve development of social and emotional competence and an opportunity to integrate all of these approaches for a common

purpose. It is emphasized that some children may learn more easily when they see concepts delivered in pictures, while other children may learn more effectively when they listen to a story, and others may learn better by reading. Additionally, it is noted that some children may better learn these concepts when hearing them musically or singing along.

Social Skills in Pictures, Stories and Songs, an evidence-based program, was developed for the purpose of supporting young children to learn the social-emotional skills required for being ready for success at school. It was developed to support social-emotional development of preschool and early elementary grades children. This comprehensive multisensory program's theory claims that social-emotional skills might in fact be more effective when these skills are possible to integrate into children's daily routines at home or school. The program is built around four original stories featuring animal characters and four songs each for story. Each story involves a different animal character (a roadrunner, a prairie dog, a raccoon, and a porcupine) and introduces how the relevant animal learns how to use a particular skill. These stories and their corresponding mnemonics can be listed under 4 items: (1) Rosie the Roadrunner Learns to Follow Directions (BEST), (2) Prairie Dog Pete Learns to Share (PALS), (3) Roscoe the Raccoon Learns to Manage His Behavior (TEAM) and (4) Prickles the Porcupine Learns to Solve Problems (WORK). In these stories, children are introduced to the main character, the problem faced by the main character is defined, and thanks to learning and using the skill, the main character solves the problem (owing to the help of friends). The skill of following directions (BEST) acts as a basis for the other skills (Serna, Nielsen, & Forness, 2007).

The *TEAM* and *WORK* skills necessitate that children develop not only cognitive skills, but also main social skills. Each of the four stories also contain 10 distinct coloring books. The program also includes opportunities to use puppets of the story characters, role-playing practices, visual aids (such as posters), to make clay sculptures, as well as to use stories and songs. In addition, one of the animal characters is involved in and a skill is handled in each song along with its related mnemonic. In the program, the process of review involves using flash cards and playing bingo. Additionally, four-six lessons are dedicated to each skill. The sequences of lessons are as follows: First, children prepare for the learning skills by listening to the characters of the story, which address the skills. Second, a small group or whole-class is directed to explore the situations where the skills may be useful and how they can be useable. Third, children listen to and sing songs related to the skill in order to present to the other specific skill steps. Forth, teacher makes a modelling for the steps of the skill, asks children for feedback and teacher gives the opportunity to role-play the skill (Serna, Nielsen, & Forness, 2007). Although there are no relevant experimental studies on the effectiveness of this program in the literature, it is emphasized that this program is a social-emotional learning intervention program for children.

4. Conclusions and Future Directions

This paper reviewed available social-emotional learning intervention programs based on different theoretical orientations. Five intervention programs were reviewed in this study: "*You Can Do It! Education", "The Tools of the Mind", "Conscious Discipline: Building Resilient Classrooms", "INSIGHTS"* and "*Social Skills in Pictures, Stories, and Songs". In this context, it was concluded based on the result of this review that social-emotional learning intervention program titled *You Can Do It!* is based on cognitive-behavioral theory, and *The Tools of the Mind* is based on cultural-historical theory, whereas *Conscious Discipline: Building Resilient Classrooms* is based on brain-theory. Social-emotional learning intervention program entitled

INSIGHTS is based on temperament theory and *Social Skills in Pictures, Stories, and Songs* is based on multisensory theory. The review process indicated that these intervention programs are extremely important for developing social-emotional learning in preschool children. An important point to remark is that distinct social-emotional learning intervention programs may differentially emphasize different activities and thereby produce differential effects.

There are some similarities and differences between social-emotional learning intervention programs that were handled in the scope of this study. Overall, all programs which are entitled *You Can Do It! Education, The Tools of the Mind, Conscious Discipline: Building Resilient Classrooms, INSIGHTS* and *Social Skills in Pictures, Stories, and Song* bear the purpose of developing social-emotional learning skills of children. These programs assert that social-emotional learning skills are highly essential for lifetime. In the meanwhile, all these programs agree that social emotional learning skills should be developed at early ages. Studies based on these programs emphasize that preschool years are important for developing social-emotional learning skills. Although each one of these programs is based on specific theories, they also include various practices and activities.

Apart from *Social Skills in Pictures, Stories, and Songs* program, there are some available experimental researches based on effectiveness of other social-emotional learning programs in the literature. Results of these studies indicated that *You Can Do It! Education* (Ashdown, & Bernard, 2012), *The Tools of the Mind* (Blair, McKinnon, & Daneri, 2018; Solomon et. al., 2018), *Conscious Discipline* (Chavez, 2014; Sorell, 2013), *INSIGHTS* (McCormick et. al., 2015b; O'Connor et. al., 2014) were effective in improving social-emotional learning skills of children. Generally, *You Can Do It! Education* had a positive effect on well-being and reducing problem behaviors, including the problems of externalizing, internalizing and hyperactivity. *Tools of the Mind* was effective in increasing social-emotional competence, positive relationships, and self-regulation, as well as in decreasing aggression, conduct problems, and emotional symptoms. In addition, *Conscious Discipline* program was effective on management skills and strategies, and emotional development. This program improved teacher's perceptions of management skills and decreased time and frequency of children's misbehaviors. Similarly, the program contributed to providing a more positive classroom climate and reducing aggressive behaviors. The *INSIGHTS* program also improved children's reading and math achievement, as well as attention skills, and it yielded reductions in disruptive behaviors by empowering their social-emotional learning behaviors. Although there is no evidence-based study result related to *Social Skills in Pictures, Stories, and Songs* program, it was stated (Serna, Nielsen & Forness, 2007) that this program was developed with the object of help children learn the essential social-emotional skills for being ready and successful at school.

Social Skills in Pictures, Stories, and Songs based on multisensory approach is achieved using visual, auditory, kinesthetic methods. For example, children are involved in listening to stories and songs, playing bingo, using flash cards, role-playing, and making clay sculptures. *The Tools of the Mind* based on the cultural-historical theory includes coaching, collaboration, mentoring, joint problem solving, and cooperative learning practices. In other words, make-believe play sessions, productive activities, the freeze game, buddy reading, learning plans, the numerals game, games with rules, story discussions, and scaffold writing are included in this program. The *You Can Do It!* program based on cognitive-behavioral theory supports competencies of children by explicitly teaching specific ways of thinking (habits of the mind). Based on this, the *You Can Do It! Early Childhood Education Program* includes role-playing and teacher involvement activities with five different puppets. Additionally, *INSIGHTS* based on temperament theory contains activities including puppets, videotaped vignettes, flash cards,

and workbooks. Whereas, *Conscious Discipline: Building Resilient Classrooms* based on the brain-based research theory includes activities related to mindfulness and different development areas. Noticeably, this program does contain neither rewards, nor punishment. It is widely seen that social-emotional learning programs for preschools use materials/methods including puppets, flash cards, role-playing, and other play based activities. These may be due to the fact that, rather than the principles of the theories, they are the appropriate approaches for preschool children. Otherwise, social-emotional learning intervention program *Social Skills in Pictures, Stories, and Songs* based on the comprehensive multisensory theory especially differs from others in terms of presentation format of the skills. In this program, specific skills are presented to children through animal characters (including a roadrunner, a prairie dog, a raccoon, and a porcupine) and their songs.

It was stated that there are certain sessions (such as 45-minute lessons during 10 weeks) in the study related to the *INSIGHTS* program. Nevertheless, *You Can Do It! Education* based on the cognitive-behavioral theory is usually called a time-limited theory. Another point is that *Tools of the Mind* is not only a social-emotional learning program, but also it is an approach to early childhood education. As such, *Tools of the Mind* can be used as an early childhood education program. Accordingly, this program focuses on building literacy and mathematics, besides social-emotional learning skills. *Tools of the Mind* is described as a comprehensive program just as *INSIGHTS* and *Social Skills in Pictures, Stories, and Songs.*

In addition, the *Social Skills in Pictures, Stories, and Songs* approach especially claims that children learn better, when information is presented in different methods. Contrary to this, social-emotional learning intervention program based on cognitive behavioral theory called *You Can Do It! Education* teaches social-emotional learning with social situations. In other words, it is an approach to help children develop social-emotional learning skills by supporting their thinking forms or cognitions. As such, *You Can Do It! Early Childhood Education Program* includes a great many of explicit and structured lessons focused on foundational skills and the habits of the mind. Whereas, in *Tools of the Mind* based on cultural-historical theory, which is known as Lev Vygotsky's theory, the focus is given on the role of environmental conditions that affect development. It is suggested by the *Tools of the Mind* program that the role of adults and peers in transmitting information about both cultural and social expectations is important. In this context, *Tools of the Mind* program focuses on Vygotskian activities to use existing social-emotional behaviors. Moreover, *INSIGHTS* based on temperament theory contributes to enhancing the fit between the environment and temperament of children. The theory in this program focuses on providing an appropriate matching opportunity between the wishes-expectations-opportunities and the temperaments of children. In this context, this social-emotional learning intervention program contains responsive teaching and parenting strategies. Conversely, *Conscious Discipline* is focused on brain-based development and it is believed that brain-based development will contribute to development and learning of adults and children. As such, the program includes seven powers (power of perception, power of unity, power of attention, power of free will, power of acceptance, power of love, and power of intention) in order to create images of expected behaviors in adult's and children's brains. In other words, this program includes different domains of learning such as social-emotional, cognitive, cultural, and physical domains.

Conscious Discipline tends to develop social-emotional learning skills in preschool children by first developing adult's skills and internal states and then subsequently strengthening the adult to teach such skills to children and model them with children. Thus, this program consists of practices for discipline issues including empathy, assertiveness, encouragement, composure,

positive intent, choices, and consequences. Furthermore, The *INSIGHTS* intervention program contains several sessions for the parent and teacher programs. All teachers and parents are sent invitations to participate in facilitated sessions and during the same time (10 weeks), children participate in classroom activities. In the meantime, *You Can Do It! Education* includes three parent information sessions as well as activities for children. It is also seen important that these three intervention programs encourage family involvement and parent education.

All the information and findings indicated that social-emotional learning programs based on different theories entitled *"You Can Do It! Education", "The Tools of the Mind"* and *"Conscious Discipline: Building Resilient Classrooms"* as well as *"INSIGHTS"* and *"Social Skills in Pictures, Stories, and Songs"* can be used to develop various skills and behaviors of preschool children. It is recommended that results of such studies should be reviewed to support social-emotional learning skills in children by an effective way. It should also be known that the content of the theories should be examined together with the scope of the programs.

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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TEACHER EFFICACY AND ITS CORRELATES IN THE EFL CONTEXT OF IRAN: THE ROLE OF AGE, EXPERIENCE, AND GENDER

Research Article

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TEACHER EFFICACY AND ITS CORRELATES IN THE EFL CONTEXT OF IRAN: THE ROLE OF AGE, EXPERIENCE, AND GENDER

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Abstract

Teacher efficacy is a context and culture-specific construct. The current study explored the two types of teacher efficacy (individual and collective teacher efficacy) among Iranian English language instructors. Moreover, this study was an attempt to discover whether age, gender, and experience can significantly influence perceptions of collective and self-teacher self-efficacy. Data were collected from 130 English language instructors through Tschannen-Moran and Woolfolk Hoy's (2001) Teacher Sense of Efficacy Scale (TSES) and Goddard's (2002) Collective Teacher Efficacy Scale questionnaires. Multivariate Analysis of Variance (MANOVA) showed no significant difference between the English instructors' collective teacher efficacy and teacher self-efficacy and their respective subscales. Furthermore, the results indicated no meaningful differences in perception among teachers with different age, experience, and gender levels across all the subscales of collective teacher efficacy or teacher self-efficacy. We conclude that efficacy beliefs seem to be resistant to change once established and may not change significantly with age, experience and gender.

Keywords: Teacher-efficacy, Self-efficacy, EFL, Collective teacher efficacy

1. Introduction

Self-related perceptions have been of interest for personality and social psychology researchers (Bong & Skaalvik, 2003). In general, terms such as 'self-concept', 'self-esteem', 'self-worth', and 'self-efficacy' fall under the umbrella term of "self-referent thought", or alternatively "self-perception" (Shavelon, Hubner & Stanton (1976 cited in Bong & Skaalvik, 2003); that is, different ways of thinking about and perceiving the self.

Self-efficacy is defined as an individual's judgement and estimation about one's ability to reach a specific goal. Bandura (1997) described self-efficacy as "the belief in one's capabilities to organize and execute courses of action required to produce given attainments" (p. 3). In sum, self-efficacy is usually considered as a belief about one's level of competence in a particular future situation (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998), and it is looked at as a motivational construct which, according to Tschannen-Moran, et al. (1998) is the result of one's perceptions, not necessarily one's competence.

Teachers' self-efficacy (TSE), or their "belief or conviction that they can influence students' learning, even those students who may be difficult or unmotivated" (Guskey & Passaro, 1994, p. 4), has been consistently researched for over 40 years now (Klassen, Tze, Betts& , Gordon,

2010). Teacher self-efficacy influences "the efforts teachers put into teaching, the goals they set, and their level of aspiration" (Tschannen-Moran, Woolfolk & Hoy, 1998: 19). Efficacious teachers demonstrate more planning and organization (Allinder, 1994). As Tschannen-Moran et al. (1998) argue "greater efficacy leads to greater effort and persistence, which leads to better performance, which in turn leads to greater efficacy" (p. 234).

Teacher efficacy is context-specific, i.e. a highly efficacious public high-school English teacher might feel very inefficacious teaching English in private language institutes. Although more experienced teachers rely on their memories and interpretations of their past experiences, the novice teachers frequently analyze the teaching task (Tschannen-Moran & Hoy, 2007). Therefore, if one wants to make judgment of teachers' efficacy, teaching task and its context should be accounted for.

Competent and effective teachers can enhance students' feelings towards their own selves and improve their outcomes (Goddard & Goddard, 2001; Gibson & Dembo, 1984; Chacon, 2005). Such teacher efficacy studies not only have the potential to improve and enrich language teaching in different instructional environments, but also can provide more interesting and effective avenues for teacher development programs in educating efficacious teachers.

Barcelos, Ghaith, and Shaaban (1999) explored the relationship between teacher characteristics (e.g., gender, experience, and grade level taught), and teacher efficacy. Experience and personal efficacy were found to be negatively related to teaching concerns perceptions while factors such as gender, grade level taught, and general efficacy were not correlated to the categories of teaching concerns. Their study revealed that personal and general teaching efficacy were not related internally while the categories of teaching concerns were related internally and this suggested that personal and general efficacy represent two different indices that should to be measured separately(Ashton & Webb,1986, Ghaith & Yaghi, 1997, Gibson & Dembo,1984; Hoy & Woolfolk, 1990. They found that novice teachers and those with low efficacy were more concerned about both the teaching task and their impact in comparison with their more experienced and efficacious counterparts. Both gender and teaching level (e.g., teaching at elementary or intermediate level) were not related to the perception of teaching efficacy. Contrarily, Pigge and Marso (1994) reported that female teachers in elementary schools of America had higher teaching concerns compared to the male secondary school teacher counterparts.

The research reported above contributes to general perceptions of L2 teachers and students of certain aspects of teaching and learning. Some of these variables such as gender (Pigge & Marso, 1994), previous school experiences (Ryan, 2007), and overall experience were the chief ones (Silvia, 2003). However, many questions still remain such as how EFL teachers' perceptions of efficacious behavior varies and which similar or different beliefs exists between male and female teachers. The observed male-dominancy of instructors in Iranian academic context particularly at post-graduate level, occupational distribution, and workplace earnings prompted the researchers to probe this issue in the EFL context of Iran. The current literature shows that teacher efficacy improvements can lead to more job satisfaction, feelings of competence, and thus decrease burnout (Dixon et al., 2014; Sariçam & Sakiz, 2014). Furthermore, Eells's (2011) meta-analysis of studies on educational achievement and collective efficacy showed that the beliefs teachers hold about school performance in general are "strongly and positively associated with student achievement across subject areas and in multiple locations" (p. 110).

Moreover, teachers' perceptions of their own self-capability are vital to student learning (e.g., Armor et al., 1976; Gibson & Dembo, 1984; Ross, 1992, cited in Tschannen-Moran et al., 1998), teaching enthusiasm and clarity (Tschannen-Moran et al, 1998), innovation

willingness (Berman, et al., 1977; Guskey, 1984; Smylie, 1988), stress level of teachers (Parkay, et al. 1988; Greenwood, et al., 1990), and teacher willingness to stay or leave the profession (Glickman & Tamashiro, 1982).

More recently, researchers have shown that as well as individual teacher efficacy, collective teacher efficacy is positively related to differences of student performance at schools (Bandura, 1993; Goddard, Hoy, & Woolfolk, 2000). Goddard and Goddard (2001) refer to some factors as correlates of collective teacher efficacy. Some based on the related literature are as follows: consultation openness to educational issues (DeForest & Hughes, 1992) positive attitudes to reform of education (DeMesquita & Drake, 1994; Guskey, 1988; Smylie, 1988), teacher satisfaction (Lee, Dedrick, & Smith, 1991), and increase in the extent of parental involvement in schooling (Hoover-Dempsey, Bassler, & Brissie, 1992, 1987).

The available literature attaches considerable importance to teacher efficacy and its correlates (Henson, 2001; Tschannen-Moran et al., 1998). Despite the plethora of research on different aspects of English instructors' self-efficacy, the literature is still scant with regard to the role of sociodemographic factors (age, race, ethnicity, and experience) in enhancing or decreasing teachers' sense of efficacy. This study investigates the impact of gender, teachers' level of experience, and age level on EFL university instructors' general teaching efficacy. There is scarcity of studies in the EFL context of Iran on the impact of personal and contextual variables on teachers' efficacy perception, classroom management, and teacher professional development. Efficacy studies not only have the potential to improve and enrich language teaching in Iran, but can also provide input for interesting and effective ways of teacher development programs with an emphasis on educating efficacious teachers. This study examined the following questions:

1. Is there any meaningful differences between male and female EFL instructors in their self and collective teacher efficacy perceptions and their respective subscales?

2. Is there any meaningful differences between high and low-experience EFL instructors in their perception of teacher self and collective efficacy and their subscales?

3. Is there any meaningful differences between higher and lower age EFL instructors in their perceptions of teacher self and collective efficacy and their subscales?

2. Background

2.1. Teacher Self-efficacy and Its Subscales

Teacher efficacy construct is mainly derived from Bandura's self-efficacy theory (1997). Within educational arenas, it mainly refers to teachers' belief in their ability to positively influence students' intended learning outcomes (Tschannen-Moran et al, 1998). Tschannen-Moran and Woolfolk Hoy (2001), following Armor et al. (1976 cited in Tschannen-Moran et al., 1998) and Bandura (1997), define teacher efficacy as teachers' judgement of their capabilities to produce intended learning outcomes stemming from student engagement and learning among unmotivated or difficult students. Abdollahzadeh and Rezaeian (2011) investigated the relationship between collective teacher efficacy, teacher self-efficacy and its components in the EFL context of Iran and found that none of the collective efficacy subscales was a stronger predictor of university teachers' self-efficacy.

2.2. Collective Teacher Efficacy and Its Domains

Self-efficacy perceptions and beliefs of teachers about the collective capability of a school or faculty has been a key concern for many researchers. Obviously, teaching occurs in a context. Teachers should work together conjointly to change students' lives. Thus, it is important to consider the social context of the school in teacher efficacy studies. As Goddard

at al. (2004) observed, collective teacher efficacy is "an emergent group-level attribute – the product of the interactive dynamics of the group members" (p.483). Put it another way, collective efficacy is not only the sum of individual characteristics and attributes, but "the groups' shared belief in its conjoint capabilities to organize and execute courses of action required to produce given levels of attainments" (Bandura, 1997, p. 477).

Collective efficacy differs from individual teacher efficacy because it is not the sum of individual competency. Hence, what matters for collective teacher efficacy is to what extent teachers perceive the whole faculty as successful. The collective efficacy framework employed in this research is Tschannen-Moran, Woolfolk Hoy, and Hoy (1998) model of teacher efficacy. Attainment expectations in this model depend on two collective teacher efficacy domains known as teaching task analysis and group competence assessment. Of note is the point that separation of these two domains is difficult because are they occur simultaneously (Goddard, 2002).

Many correlates of teacher efficacy pertain when various efficacy measurements and scales are taken into account. Not only is teacher efficacy related to teacher behavior, but it relates to students' efficacy perception (Anderson et al., 1988) and achievement as well (Midgley, Feldlaufer, & Eccles, 1989).

Compared to teacher self-efficacy, collective teacher efficacy is a less explored domain. As Bandura (1997) states "although perceived collective efficacy is widely recognized to be highly important to a full understanding of organizational functioning, it has been the subject of little research in schools" (p. 468, cited in Goddard & Goddard, 2001). One of the earliest efficacy studies by Bandura (1993, cited in Goddard & Goddard, 2001) showed that collective efficacy and school-level achievement are significantly and positively related.

2.3. Sources of Efficacy

Bandura (1997) mentioned four information sources of self-efficacy: mastery experiences, arousal of physiology or emotion, vicarious experience, and social persuasion. The review of the studies on the sources of efficacy beliefs indicates that the most powerful source among these four is mastery experiences. According to Tschannen-Moran and Woolfolk Hoy (2007), mastery or enactive experiences are the sense of satisfaction obtained through one's past teaching successes. Mastery experiences are important for strengthening not only self-efficacy but also collective efficacy (Goddard & Goddard, 2001).

The other way of altering efficacy beliefs, i.e. physiological and emotional arousal, is "to enhance physical status, reduce stress and negative emotional proclivities, and correct misinterpretations of bodily states" (Bandura, 1997, p.4). That is, the circumstances, the history of person and the overall arousal level are determining factors in the interpretation of increased perspiration, trembling hands or increased heart rate (Bandura, 1997 cited in Tschannen – Moran et al., 1998).

Since teaching is performance-based, the belief in one's ability to teach a particular subject and/or to teach well in general, may be affected by years of teaching experience. Teachers' mastery experiences along with variables such as student achievement, and student engagement have been reported to be associated with teacher self-efficacy (Malmberg et al., 2014). In the same vein, in this research we investigate the difference between perceived teacher efficacy of the high-experienced and low-experienced EFL instructors. Moreover, the age of the participants is also investigated to probe the effect of vicarious experience on the perceived teacher efficacy.

2.4. Socio-demographic Factors and Teacher-Efficacy: Role of Gender, Experience, and Age

Gender studies in this regard involve the distinction the teachers' sex may make in their instructional method(s), interaction types with their learners, and even evaluations of their own teaching performance (Pigge & Marso, 1994; Verhoeven, 1997).

Betz and Hackett (1981) found that girls do as well academically as boys but have lower perceived self-efficacy. While progress has been made in recent decades, it is clear that gender differences in academic fields of study, occupational distribution and workplace earnings persist (Blau & Kahn, 2000). Previous research has shown conflicting results about women professors' teaching behaviors and ratings The studies of teaching behaviors and ratings of women professors revealed conflicting results. Regarding classroom interaction approaches of teachers, Canada and Pringle (1995) postulated that male and female teachers negotiated differently in mixed and single-sex classrooms. They observed that "female-led, mixed-sex classes were more professor-driven and were less student-driven than were male-led, mixed-classes" (p.177), and in all-female classes, the female professors behave more male-like and the male professors behave more female-like" (p.178). On the other hand, the results of other studies on the probable effects of gender on self-efficacy have shown no significant difference between teachers (either male or female) in their evaluation of their sense of self-efficacy (Schunk & Pajares, 2010).They attributed lack of significant difference to culture-specific personality dispositions. Oettingen (1995 cited in Bandura, 1997) analyzed the dimensions of cultural diversity and their impact on the information sources of self-efficacy in different contexts. The results pointed to the societal institutions' power, which in some cultural ways, modify different sources of self-efficacy information in different aspects such as prevalence, form, and evaluation.

For Vieluf, Kunter and Vijver (2013, p.96), national cultures could influence teacher self-efficacy in the following ways:

> 1. The basic structure of the construct may be culturally contingent, which would imply that behaviors and beliefs associated with teacher self-efficacy would vary across cultures and that there is no basis for comparing the construct across nations.

> 2. The strength of associations with educational processes and outcomes may vary, which would suggest that the psychological and practical relevance of the construct varies across countries.

> 3. Cross-national differences in average teacher self-efficacy could reflect genuine cross-national differences as well as differences in self-presentational norms.

According to Tschannen-Moran and Hoy (2007), the strongest source of efficacy perceptions of novice teachers is verbal persuasion, while mastery experience is the obvious efficacy source of experienced teachers.

Reviewing the related literature on the effect of age on efficacy perceptions show negative to positive effects of age on efficacy. Ghanizadeh and Moafian (2009) found age is positively related to higher self-efficacy, while studies by Edward and Robinson (2012, cited in Lesha, 2017), and Smit & Bosscher (1998), revealed that younger teachers had greater self-efficacy beliefs. On the other hand, Bandura (1995) stated that age is not related to self-efficacy although efficacy beliefs vary during everyone's life spans. Moreover, Jenks (2004, cited in Lesha, 2017), Hicks (2012, cited in Lesha, 2017) and Tschannen-Moran and Woolfolk Hoy (2007), found no significant relationships between age and self-efficacy.

This study is bound within the national culture of Iran. Therefore, the researchers in this study probed the potential difference between Iranian male and female English university instructors to see if growth in professional knowledge and commitment to teaching and increased competence can affect the efficacy beliefs of male and female instructors differently.

2.5. Teacher Efficacy in TESOL

In the field of TESOL (Teaching English to Speakers of other Languages), research on teacher efficacy usually emerges from cultures of English language teaching places. Chacon's (2005) study showed that teachers' perception of efficacy had a significant correlation with teachers' English proficiency reported by themselves, and that efficacy of teachers for instructional strategies was higher compared to management and engagement efficacy levels among EFL teachers in Venezuelan middle schools. "Diversity of professional activities teachers engage in, average number of students per class, working position, type of institution, and gender were the socio-demographic factors that predicted variations in EFL teachers' efficacy in Turkey" (Yavuz, 2007 p.1). Eslami and Fatahi (2008, p.2) found "the more efficacious the teachers felt, the more inclined they were to use communicative-based strategies" in Iran. Lee's (2009) research showed that oral English language use and attitude of Korean English teachers were influencing teachers' sense of efficacy highlighting context-specificity of teacher efficacy (p.69).

3. Method

3.1. Participants

130 male and female university instructors of English from all over Iran voluntarily participated in the study. Their teaching experience at Iranian universities ranged from 1 to 35 years. They were selected from a mix of state and private universities. The whole sample was split into low experience (with less than 3 years of teaching experience) and high experience instructors (with more than 3 years experience). Their age varied from 23 to 60 with a mean age of 36 (see Table 1).

Table1. *Participant distribution in terms of age, gender, and experience*

	Age		Experience		Gender	
	Higher	Lower	High	Low	Female	Male
N	64	66	61	69	41	89

They were contacted either by email or through personal contact, and they all volunteered to participate. They were also assured about their anonymity and their details and responses will be kept confidential and only used for research purposes.

3.2. Instrumentation

Two instruments, i.e. Teacher Self-Efficacy Scale (TSES), originally developed by Schannen-Moran & Woolfolk Hoy (2001), and the Collective Teacher Efficacy Instrument (CTEI) developed by Goddard (2002) were used. The responses to both questionnaire items were on a 9-point Likert scale ranging from 1 (*never*) to 9 (*great amount*) showing the instructors' extent of agreement with an item. The TSES questionnaire included 12 items on different aspects of teacher efficacy and the CTEI included 10 items on different collective teacher efficacy dimensions. The CTES questionnaire was designed based on a social cognitive model. In their attempt to develop a measure of collective efficacy, Goddard, et al. (2001) chose a group orientation for the items in the collective efficacy scale. Goddard, et al.'s model of

CTEI items were developed in such a manner that both group competence (GC) and task analysis (TA) teachers were considered in their efficacy assessments.

3.3. Procedure

This research essentially employed a survey methodology. To assess the teachers' perceptions of their colleagues' efficacy (i.e. collective efficacy), the 12-item scale of CTES was used. As Goddard. (2002, p. 107) found, "the 12-item scale compared to the earlier 21-item scale was more theoretically pure, and these two were found to be highly correlated ($r = .983$, $p<.001$), suggesting that little change resulted from the omission of almost 43% of the items". The items in the questionnaires were on a 9-point scale so that the probability of the answers could be increased (Bandura, 1997). As Bandura (cited in Siwatu, 2005, p.44) contends, "including too few steps loses differentiating information because people who use the same response category would differ if immediate steps were included". Some minor modifications were made to the CTES in order to make it more compatible with the target situation. For example, the item, "The lack of instructional materials and supplies in this school makes learning very difficult", was replaced with "Learning at my university is more difficult because of students' worries about their exams". These changes were minimal; therefore, the conceptual structure of the questionnaire and its validity were kept intact. The final version of the questionnaire was checked by three applied linguistics researchers and their comments as to the intelligibility, format, and item classification were sought.

To measure teacher's perceptions of their self-efficacy, the short version of the Teachers' Sense of Efficacy Scale (TSES) developed by Tschannen-Moran & Woolfolk (2001) was used. This questionnaire was further developed and modified by Chacón (2005) to fit the ELT context of Iran. TSES consisted of 12 items on a 9-point scale.

The two questionnaires tapping teacher self-efficacy and teacher collective efficacy scales were administered to 130 Iranian English instructors all over Iran. Initially, the instructors were contacted through email. The questionnaires were sent to those who expressed willingness to participate in the study. Those who participated were also sent valuable EFL textbooks and articles as a bonus.

The collected questionnaires were codified, and their data were entered into the SPSS Software (Version 19). Cronbach Alpha indicated reliability indices of .83 and 0.94 for the CTE and TSE questionnaires respectively. Then, EFL instructor's perceptions of different subscales of efficacy were analyzed and described. The missing item score was replaced with the item mean score. Multivariate Analysis of Variance (MANOVA) was conducted to discover any significant difference between the English instructors' efficacy perceptions and their related subscales.

4. Results and Discussion

Table 2 presents descriptive statistics on different aspects of the EFL instructors' efficacy based on the instructors' responses.

Table 2. *Descriptive statistics on EFL instructors' self-efficacy*

Construct	Mean	SD
Student Engagement	27.14	5.01
Classroom. Management	29.40	4.49
Instructional Strategies	28.56	4.87
Sum of Collective Efficacy	48.33	8.26
Task analysis	24.48	5.39
Teaching Competence	23.71	5.05

A detailed descriptive statistics of higher and lower age instructors' performance on different constructs of the questionnaires is presented in Table 3. As can be seen, the mean scores were very close between the two age groups.

Table 3. *Descriptive statistics higher and lower age EFL instructors' efficacy*

	Age level	Mean	SD	N
Total collective efficacy (TCE)	higher	48.28	8.60	64
	lower	48.43	7.09	66
TCE group competence	higher	23.98	5.05	64
	lower	23.82	4.95	66
TCE task analysis	higher	24.30	5.22	64
	lower	24.61	4.32	66
Total self-efficacy (TSE)	higher	84.46	13.52	64
	lower	86.39	11.03	66
TSE student engagement	higher	26.52	5.54	64
	lower	27.83	4.80	66
TSE class management	higher	28.94	5.05	64
	lower	29.89	3.80	66
TSE instruction strategy	higher	28.91	4.99	64
	lower	28.67	4.37	66

Similarly, descriptive statistics of higher and lower experience instructors' performance (see Table 4) show rather close mean performances across both groups.

Table 4. *Descriptive statistics on high / low experience EFL instructors' self-efficacy*

	Experience	Mean	SD	N
Total collective efficacy (TCE)	High	48.76	8.41	61
	Low	48.00	7.34	69
TCE group competence	High	23.71	5.11	61
	Low	24.07	4.89	69
TCE task analysis	High	25.05	4.87	61
	Low	23.94	4.65	69
Total self-efficacy (TSE)	High	86.49	11.69	61
	Low	84.51	12.84	69
TSE student engagement	High	27.28	5.26	61
	Low	27.10	5.19	69
TSE class management	High	30.20	3.81	61
	Low	28.74	4.91	69
TSE instruction strategy	High	29.02	4.67	61
	Low	28.58	4.69	69

A description of the male and female instructors' perceptions of teacher efficacy is presented in Table 5 below.

Table 5. *Descriptive Statistics on male and female EFL Instructors' Self-efficacy*

	gender	Mean	SD	N
Total collective efficacy (TCE)	male	48.25	8.07	89
	female	48.59	7.41	41
TCE group competence	male	24.08	4.92	89
	female	23.51	5.14	41
TCE task analysis	male	24.17	4.77	89
	female	25.08	4.76	41
Total self-efficacy (TSE)	male	84.55	12.76	89
	female	87.37	11.19	41
TSE student engagement	male	26.69	5.24	89
	female	28.27	5	41
TSE class management	male	29.37	4.68	89
	female	29.54	4.044	41
TSE instruction strategy	male	28.49	4.85	89
	female	29.41	4.24	41

A comparison of the perceptions of instructors with different age, gender, and experience levels can help us discover any potentially significant differences in their perceptions. Accordingly, to answer the research questions of the study, Multivariate Analysis of Variance (MANOVA) was conducted (see Table 6).

Table 6. *MANOVA results on the impact of age, gender, and experience*

Source	*Dependent Variable*	*F*	*Sig.*	*Partial Eta Squared*
Corrected Model	total collective efficacy	.934	.611	.795
	total self efficacy	.997	.529	.806
Intercept	total collective efficacy	2076.870	.000	.988
	total self efficacy	2789.121	.000	.991
Age	total collective efficacy	.949	.552	.487
	total self efficacy	.745	.767	.427
Gender	total collective efficacy	.026	.873	.001
	total self efficacy	1.203	.283	.046
Experience	total collective efficacy	.830	.649	.361
	total self efficacy	1.004	.485	.406
Age * Gender	total collective efficacy	.796	.611	.203
	total self efficacy	.278	.967	.082
Age * Experience	total collective efficacy	.869	.652	.534
	total self efficacy	.997	.510	.568
Gender * Experience	total collective efficacy	.839	.513	.118
	total self efficacy	.809	.531	.115
Age * Gender * Experience	total collective efficacy	.026	.873	.000
	total self efficacy	1.203	.283	.000

No significant differences were found between teachers with higher and lower age levels in terms of their teacher efficacy and its related subscales (see Table 6). Similar results were also found for male and female teachers. That is, no meaningful differences in terms of self-efficacy between male and female teachers were found. Higher experience teachers were not significantly different in terms of their self-efficacy from lower experience teachers. Iranian TEFL instructors' self-efficacy beliefs seem to have firmed up and learned early and, in line with Bandura's (1997) assertion, that efficacy beliefs seem resistant to change once set.

Furthermore, potential patterns of interaction between each of the independent variables were also examined. However, no significant interactions were identified between age level and gender on the one hand, and between age level and experience on the other. Similarly, no meaningful interactions were found between gender and level of experience. Multiple interactions between age, experience, and gender were not found either.

As for the role of gender, reviewing the related literature suggested higher probability of greater teacher self-efficacy and collective teacher efficacy among male teachers. Nonetheless, contrary to our expectations, this was rejected, nor did we find significant differences between subscales of teacher self-efficacy and collective teacher efficacy. Lack of significant differences between male and female instructors' perceptions of efficacy for student engagement or classroom management goes against Chen and Thompson's (2003) study which showed Taiwanese female university instructors made more attempts to involve students in the classroom (having higher efficacy for student engagement), and male university instructors had a greater tendency to employ personalization in their classes (having higher efficacy for classroom management). Iranian female instructors of TEFL had more or less similar levels of efficacy as their male counterparts. This can refer to growth in both sex's professional knowledge and in their commitment to teaching and increasing their competence. This finding might challenge the view that with a growth in female student body in higher education, we might in the future be moving towards EFL contexts which undergo a process of feminization (Statham, Richardson & Cook, 1991, cited in Chen & Thompson, 2003). It should be noted, however, that this trend might not be the case in Iranian universities as at present a considerable proportion of Iranian EFL instructor population is male. However, it can be the case in the near future.

A significant difference between high and low experience instructors was expected in the second question as we hypothesized that one who remains in teaching must own higher teacher efficacy levels compared to those who quit teaching during their first few years of instruction. Accordingly, those remaining in the teaching profession can boost their perceptions of efficacy as a result of greater levels of mastery experiences. However, no such significant difference was observed. This finding corroborates studies which show a non-linear relationship between teacher efficacy and experience (e.g., Klassen & Chiu, 2010; Ross, Cousins, & Gadalla, 1996; Ghaith & Yaghi, 1997, Wolters & Daugherty, 2007) where teacher efficacy first "rises until mid-career and then drops" (Klassen & Chiu, 2010, p.186).

As for the third research question, contrary to our expectations, no significant difference was found between higher age and lower age EFL instructors with respect to their teacher efficacy and collective teacher efficacy and their respective subscales. The results do not support Bandura's physiological and emotional arousal as one of the sources of efficacy beliefs. Physiological and emotional states are instrumental in people's judgment of their capabilities Stress and tension are usually interpreted as signs of reactions to poor performance. We assumed that the older one gets the manner in which affective states are interpreted and perceived would change. However, the results of the study do not support this hypothesis when it comes to EFL instructors' perceptions of their teaching efficacy. Less is known, however, about age and teacher efficacy perceptions. Our findings that efficacy beliefs of experienced teachers do not easily change once established may explain that efficacy did go down with teaching experience and this is reflected in Woolfolk Hoy & Bruke Spero's study (2005).

Given the above findings, the answer to the three questions of the study is negative. Therefore, age level, experience level, and gender differences do not significantly affect the participants' perceptions of teacher self-efficacy and collective teacher efficacy.

5. Conclusion

The main purpose of this study was to examine the role of the oft-cited variables of age, gender, and teaching experience and their impact on the teachers' perceptions of efficacy in the EFL context of Iran. This study was limited to the ELT instructors' perception following Bandura (1997) who repeatedly put emphasis on the context-specificity of this construct.

The results of this study revealed that gender, age, and experience do not significantly affect one's perception of teacher self-efficacy, collective teacher efficacy or their respective subscales. Interestingly, gender effects in the literature on TSE are mixed. While Ross et al. (1996) found male teachers have a higher teacher self-efficacy, Coladarci (1992) found female teachers to be higher in it. Similarly, females reported higher teacher efficacy than males (Greenwood, Olejnick & Parkay, 1990; Lee, Buck & Midgley, 1992; Raudenbush et al., 1992), possibly because teaching is considered a female occupation (Apple & Jungck, 1992), but Malmberg et al. (2014) found no gender differences. The results challenge some previous research that female teachers generally illustrate a higher level of teacher self-efficacy (Apple & Jungck, 1990), but male teachers report higher classroom management efficacy (Klassen & Chiu, 2010). Klassen and Chiu (2010) showed that female teachers tend to report lower TSE in cases of high workload stress and stress with student behavior. These contradictory results may indicate that teacher efficacy is greatly influenced by contextual and cultural factors. Further, similar to Pas et al. (2012), work experience and academic level had no influence on teacher self-efficacy

We can speculate that efficacy beliefs are shaped in one's mind regardless of age, gender or experience. Efficacy is a future-oriented judgment that deals with perception not actual competence. (Tschannen-Moran and Wolfolk Hoy, 2001). Naturally people overestimate or underestimate their actual capabilities, and these estimations consequently affect one's persuasion strategies and attempt to pursue their actions. This might imply that efficacy might be subject to other personal characteristics (e.g. personality type) beyond the variables of this study. This needs to be established in future research.

Further, our understanding of self-efficacy beliefs of teachers may be incomplete without accounting for environmental effects because, as explained, self-efficacy beliefs play a fundamental role embedded within an environment, and the social context of teaching cannot be ignored if teaching tasks are to be effective. In general, it is difficult to describe how such beliefs are shaped and sustained during the teaching career. On the other hand, as observed in this study, teachers' self-efficacy beliefs, once set, are stable. Hence, teacher educators and school leaders need to provide the kinds of supports for pre-service and novice teachers that would result in the development of stronger and more resilient teacher efficacy perceptions. Future studies can focus on observations of instructor' classes, focusing on gender and experience of the instructors for the probable under/overestimations of efficacy perceptions.

In future, professional development programs can be developed to emphasize the awareness of efficacy beliefs among English teachers. Teacher training programs have shown to positively augment teacher's awareness of their potential inefficacies and a higher level of teacher self-efficacy (Kazempour & Sadler, 2015).

Reflection on efficacious teachers' expected standards and capacities could develop our understanding of teacher efficacy in EFL education. To determine the physiological and emotional arousal influences on teacher efficacy during the period of teachers' professional lives, longitudinal studies should follow. The results of this study were mainly based on teachers' rating of their perceptions on two questionnaires. Further triangulation studies

employing interviews, diaries, and/or journals can determine more specifically what factors influence teachers' performances rooted in their perceptions of efficacy.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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AN ALTERNATIVE TEACHING TOOL IN SCIENCE EDUCATION: EDUCATIONAL COMICS

Review article

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AN ALTERNATIVE TEACHING TOOL IN SCIENCE EDUCATION: EDUCATIONAL COMICS

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Abstract

Comics, which attract attention with their adaptation to changing conditions in the historical process, are increasing their popularity both in current life and in the field of education. They can be used as a powerful supplementary teaching tool concretizing abstract concepts, especially in lessons such as Science. They can also be used to convey abstract concepts to students in an entertaining way. From this point of view, the study aimed to reveal the general characteristics, structure, elements, and historical development of comics at a theoretical level. The study, which adopted a qualitative research design, was based on a wide range of a literature review focusing on comics in an educational context as alternative resources to use in science education. The data collected were coded, grouped, and reorganized as a report to present within the context of science education for the teachers who might plan to use comics in their classes, and researchers who might scrutinize the influence of comics in teaching science at different levels.

Keywords: Comics, supplementary tools, education and training, science education, abstract concepts

Introduction

Current developments in the field of education in the 21st century have led to a series of changes in our understanding of education. Meeting our teaching needs in our age has led to the necessity of preparing teaching materials with a new perspective in the classroom where modern education and training practices are performed together. It is possible to mention many positive effects of teaching materials such as increasing efficiency in the classroom, active participation of students (Tekmen, 2016), and providing permanent learning (Aşçı, 2020).

The most used course material in the process of gaining scientific knowledge of science is undoubtedly the textbooks prepared in accordance with acquisitions in the program. Textbooks allow the subject to be handled systematically as a guide both for teachers and students (Ünal & Demirkaya, 2019); however, in lessons such as science, which has abstract concepts which are difficult to understand, using only the textbook and not supporting it with other course materials may decrease students' interest in the lesson or decrease efficiency.

At this point, we come across comics that are becoming more and more popular in the field of education (Lazarinis, Mazaraki, Verykios & Panagiotakopoulos, 2015; Topkaya, 2016). The combination of images and texts in comics helps students to see the process more attractive by changing their perspective on learning processes (Astuti, Kismini & Prasetyo, 2014). In this respect, different researches have revealed that using comics as a teaching material will have positive contributions to the learning-teaching process (Mamola, 2019; Yang, 2003). In order to understand comics better, it is necessary to express how they are defined, to discuss their features and elements, and to include examples in the historical process. In addition, it is thought that focusing on the use of comics by addressing the role of comics in educational environments will be beneficial for teachers who will use them in their lessons.

1. Comics

Rapid technological developments and changes in our age change our perspective on teaching materials used in education and training environments. Comics, which have become popular in recent years thanks to their content and visuality, are one of these teaching materials. Studies refer to the difficulty of making a general description of comics. Emphasizing this issue, Kireççi (2008) suggests that comics can only be defined according to the current culture and time. At this point, it is important how Rodolhe Töpffer, who is considered to be the founder of modern comics and is also an art critic and educational scientist, defines comics. It is seen that Töpffer describes comics as a consecutive communication tool on a paper with images and texts and points out that the text would be incomplete without the image and that the image would be incomplete without the text (Paltani-Sargologos, 2011). Comics can also be defined as an art of fiction in which a narrative style, formed by the combination of two main elements, text and image, is adopted (Cantek, 2016). In another definition, it is mentioned that comics convey realistic or imaginary ideas by using visual images, and the humour aspect is also emphasized while conveying important messages (Toh, Cheng, Jiang & Lim, 2016). Looking at the definitions, it is seen that the researchers emphasized the combination of text and image. What needs to be noted here is that this combination comes together with a real composition, not as a simple match (Kunzle, 1973). In this case, it would not be wrong to say that comics consist of neither an image nor a text and that they are a synthesis which is achieved by combining images and texts (Cihan, 2014).

The comics industry has gone through many historical stages. Considering the term comics in general, it will be possible to divide them into branches such as graphic novel, newspaper strips, single-panel gag cartoon, superhero comics, web comics, manga, underground comics, alternative comics, and western comics (Bıçakcı, 2018). It is thought that comics, which are accepted as an art type formed in the modern age, carry the function of images and visuals one step further by including the text in the process (Orçan & Kandil İngeç, 2016). The purpose of comics, which contain intentional images created by the combination of side-by-side images, may be to convey information to the audience or to produce only an aesthetic response (McCloud, 1993).

Comics are a form of storytelling. They use a series of static images while presenting a story as a tool (Lazarinis et al., 2015). Unlike regular books, paintings, or movies, it would not be correct to characterize comics as better or worse than other genres; however, it should be admitted that they differ from other genres (Karczewski, 2013). It is important to reveal the basic characteristics of comics which are shaped by a writer in order to understand them better. The basic features of comics are given in Figure 1.

	Comics are a type of story in which images that support each other create a series of subject integrity and fit into a short timeline.
Common features of comics	In comics, fictional elements such as relationships, manners, emotions and thoughts, place and time, and cause and effect relationships are expressed with images and drawings.
	In comics, characters often have features that repeat each other.
	In comics, speech or text is included in the image, and the image and text form a whole. Comics dominated by pictures or texts can also be seen.

Figure 1. Common features of comics (Cantek, 2014; Uslu Üstten, 2014)

Considering the basic features in Figure 1, it is seen that the image in comics is at least as important as the story. At this point, it would be appropriate to mention a specific structural feature of comics. For the meaning integrity of comics, the relationship between the frames is important rather than the image in the frame. The meaning of comics in the spaces between two sequential images is related to the human mind. We complete the story of comics ourselves by creating what is not written and drawn on paper or what does not exist, in our mind. The reason for this is that our mind constructs meaning by establishing a connection between the total symbols formed by written and visual texts while transitioning from one frame to another (Gündüz, 2004). This connection is important for comic book readers to have actions in their minds more easily and to achieve meaningful and permanent learning (Akkaya, 2013).

1.1. Comics in Historical Timeline

Researchers have different comments and opinions regarding how old the history of comics are. According to some, the birth of comics is based on hieroglyphs in ancient times, while some other researchers point out that comics are based on illustrations in Leonardo da Vinci's notebook (McCloud, 1993; McCloud & Manning, 1998). However, comics are neither just images nor texts (Derdiyok, 2019). For this reason, there is no consensus on the starting point of the historical process of comics. One of the most important factors affecting the development of comics is undoubtedly the presence of a printing house. With the advent of the printing press, over time, pictures have taken on a complementary role to stories. It is, therefore, not surprising that the object was ultimately combined with art to make illustrated and narrated series (Olson, 1993).

Comics first became known in France and Belgium in the 1800s. The work named "Voyages et aventures du Docteur Festus" (Travels and Adventures of Doctor Festus), which is the first comic book in history, was completed in 1831 and was published in 1840 with the signature of Rudolphe Töpffer (Gündüz, 2004).
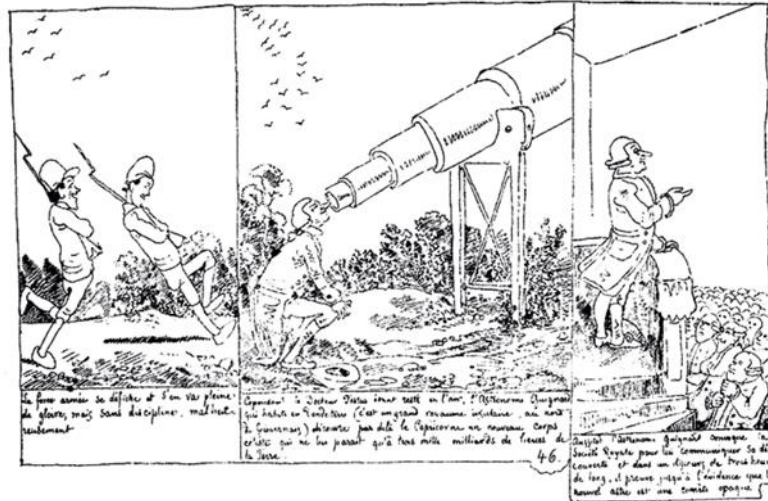
Figure 2. A section from the comic book named "Voyages et aventures du Docteur Festus" (Project Gutenberg Canada, 2013)

In the comic book seen in Figure 2, it is seen that the image and text are given together. In addition, Töpfer chose space travels with his imagination as the subject of his stories (Olson, 1993). A few years later, in 1854, French artist Gustave Doré published "L'Histoire de la Sainte Russie", a series of 477 consecutive drawings which describe the history of Russia. Around 1865, Wilhelm Busch published "Max and Mauritz", the story of two malevolent children and their hardship and final punishment. This comic book, which has a colourful image on almost every page in addition to the text, had been popular for a long time (Olson, 1993). "Les Aventures de Tintin" (The Adventures of Tintin), published by Georges Lemi in the 1920s, is a comic book that achieved a significant success in those years (Uslu Üstten & Pilav, 2016). An example section of this comic book is given in Figure 3.

Figure 3. A section from the comic book named "Les Aventures de Tintin"

With these developments in the historical processes, comics, which created a readership in Europe, first appeared in the United States in the modern sense at the end of the 19th century (Aşçı, 2020; Symeon, 2008). For the first time, Rudolph Dirks published the comic book "The Katzenjammer Kids" for the New York Times on December 12, 1897 (Armor, 1987). Meanwhile, comics in England developed under the influence of American publications, while Germany fell behind in the field of comics due to the social and economic conditions that emerged after the war (Uslu Üstten & Pilav, 2016).

In our country, the first comics entered our lives after the First World War. When the first comic book examples in Turkey are considered, it is seen that the character of "Amcabey"

drawn by the cartoonist Cemal Nadir Güler in 1929 is important. The main character of this comic book is given in Figure 4.
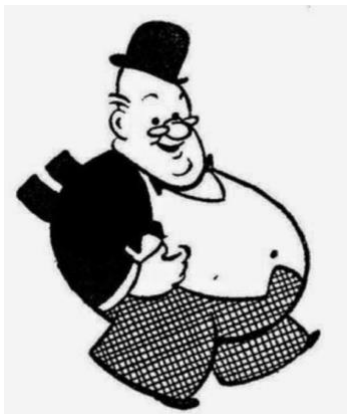
Figure 4. The main character in the comic book named "Amcabey" by Cemal Nadir

In the following years, the magazine named "Binbir Roman" published in Istanbul made an important contribution with its comic book content compared to the developments in the period (Kurt, 2019). It can be stated that qualified publications started with "Phantom" in the 1940s. In the following years, comics, which won the appreciation of our country's readers, started to appear in newspapers, especially with series of drama, adventure, love, and comedy. With the publication of colorful magazines depicting western heroes such as Mandrake, Zagor, Mister No, Flash Gordon and Tarzan, a serious comic culture was formed in that period (Çetin, 2010). Turkish comics tradition, which started with the translation method at first, later had a realistic, rational, local, and national direction that fed on Turkish history (Karagöz, 2018).

When we look at the historical process of comics, it is understood that they were accepted as a second-class type of literature or a low art form for a period, and they did not, therefore, see the value they deserved (Jacobs, 2007; Upson & Hall, 2013). The fact that comics mostly consist of images and that they do not deal with subjects deeply is accepted as the main reasons for being unfairly ignored (Tatalovic, 2009). In addition, it was suggested that comics were designed for children, people who did not like reading, or adults clinging to adolescence (Lo et al., 2019). For these reasons, there was a tendency among many educators and parents to believe that comics were created only for entertainment purposes and had little or no real educational and literary values (Lo et al., 2019). In fact, these beliefs at first prevented the use of comics in the education and training process. To exemplify, similar situations were experienced during periods when it was considered objectionable to teach comics in schools, and it was prohibited to read comics during the education process (Toh, Cheng, Ho, Jiang & Lim, 2017). Comics were traditionally seen as the "enemy" of schools, and students caught reading comics in schools were referred to the disciplinary committee (Cleaver, 2008). However, these periods did not last long, and comics, which are now appreciated as a potentially important educational tool to attract students' interest in various academic subjects, have regained the value and importance they have deserved (Tilley, 2008; Lo et al., 2019).

Today's comic books, which are more entertaining and engaging than the ones in the past and include subjects for adults, have significantly increased their popularity through comic book films and television series in recent years (Çetin, 2010). The Road to Perdition, Ghost World, Incredible Hulk, Sin City, X-Men, The Fantastic Four and Snowpiercer are among the comics adapted into films. With these films, which are the adaptations of comic book stories, the educational value of comics, which have proven their influence on popular culture, has begun to be re-evaluated by different researches (Lo et al., 2019).

1.2. Elements of Comics

Comics have elements that ensure the integrity of their unique structures. These elements that make up comics are shown in Figure 5 (Tuncer, 1993).
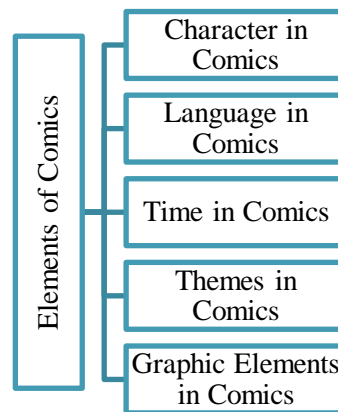
Figure 5. Elements of comics

The elements that make up comics will be explained under separate titles.

1.2.1. Character in comics

Character is the main element of comics. For this reason, many comics are named after their characters (Kireççi, 2008). The story narrated in comics is processed through characters; therefore, characters are important for the reader. Characters are in favour of goodness, direct and order (Sarıbıyık, 2018). The reader feels close to and embrace characters for a reason. In fact, the reader can sometimes experience the character's emotional state in their inner world.

Although comic book heroes are mainly selected from male characters (such as Batman and Superman), there are also comics (such as Black Widow and Wonderwoman) in which female heroes are the main characters (Mutlu, 2019; Tuncer, 1993). The main character can be male or female, as well as a plant or an animal. For example, "Snoopy", a comic book whose main character is a dog, thinks and speaks like a human.

1.2.2. Language in comics

It is possible to say that comics have a special language of expression. Thanks to the relationship between the frames, the idea to be conveyed is expressed clearly. In the spaces between the panels, the connections established on the basis of the reader's mind make the story complete by creating a part that is not drawn in the mind (Güdek, 2019). For this reason, it is very important to use a language based on visual experience that will attract the attention of the reader (Eisner, 2008). If we think of comics as a means of communication, the language created with text and images must find its counterpart in the imagination of the reader in order for communication to take place (Yavuz, 2011).

The language used in comics acts as a bridge between everyday language and academic language, which is thought to positively affect the success in the lesson (Krashen, 1993). In comics, language and expression are shown in speech and thinking bubbles. Understanding who it belongs to is provided by directing an arrow from the bottom of the balloon towards the head of the character (Sarıbıyık, 2018).

Figure 6. Speech bubbles used in comics

When the reader see the text or balloons, they understand that the character whispers (the lines that make up the speech bubble are broken), speaks loudly or shouts (text written in bold and capital letters without a speech bubble), or even thinks (the speech bubble looks like a cloud and small bubbles reaching out to the person it belongs to) (Sarıbıyık, 2018).

1.2.3. Time in comics

Time is flexible and unlimited in comics; therefore, it can be directed backwards or forwards (Sarıbıyık, 2018). It is possible to travel in time thanks to the writer in comics. It is thought that experiencing and transferring stories in comics in the present time attract the attention of the reader (Tuncer, 1993).

Comics inform the reader about the time they are in. Details such as the dressing style of characters, the architectural features of the place where the story takes place, the elements of life, the presence/absence of technological products, the primitiveness/modernity of the tools used are given both to reflect the time to the reader in a detailed and impressive way and to connect the reader to the story more. For example, in the comic "Redkit", the story takes place at the end of the 19th century. The time involved in the comic book story affected the communication method in the story. It is seen that Redkit often uses telegrams to communicate. For transportation, besides the horse carriage, a train road draws attention (Yavuz, 2011). With such visual schemes, it can give information to the reader about those periods about which they do not have much information (Sarıbıyık, 2018).

1.2.4. Theme in comics

The value judgments of societies are different from each other. Comics are also influenced by the characteristics of the society in which they originate, and are often used to comment on current issues (Tatalovic, 2009). Different comics have been developed on different subjects for various educational purposes at educational levels (Lazarinis et al., 2015). Comics dealing with history, politics, or bureaucracy can be classified within the framework of adventure, politics, and history. Classification of comics around a category can create a certain audience (Sarıbıyık, 2018). Throughout the historical process, themes in comics started with simple stories and later left their place to superheroes. After the World War I, superheroes started to lose interest and comics dealing with topics such as crime, thriller and science fiction came to the fore (Aşçı, 2020).

Comics present themes to the reader with the method of uninterrupted illustration. It is thought that it will be beneficial to reveal the details of the message that is desired to be given to the reader if the main message is presented briefly and concisely (Topkaya, 2014). The fact that people tend to and prefer topics that attract people's attention has made the concept of theme in comics one of the determining factors for the preference of the readership.

1.2.5. Graphic elements in comics

Illustrations in comics have a strong effect on keeping the story alive to the reader. Visuals in comics are effective in guiding readers' perception of spatial relationships within a certain context (Pratt, 2009). Preserving the balance between the text and the image in comics and the fact that writing does not dominate when telling the story are significant and should be considered (Sarıbıyık, 2018). Having more text disrupts the follow-up feature of continuity between the images and makes it boring (Cantek, 2014).

The use of images in comics is effective in terms of improving students' ability to construct information with more than one method (Bolton-Gary, 2012). This is very important for students to prepare for their future life (Toh et al., 2017).

2.   The Relationship Between Comics and Other Disciplines

Different disciplines communicate with each other. This context supports each other and enables the development of related disciplines (Sarıbıyık, 2018). In this section, the interaction of comics with education will be examined.

2.1. Comics in the Education Process

When we look at the historical development of comics, it is seen that they were first published in newspapers and magazines and then published in print. Later, educational and informative elements were added to the contents of comics, as a consequence of which they were used in the field of education (Karagöz, 2018). This new genre was named "educational comics".

Comics can be used as an important and powerful supplementary teaching tool in various educational environments (Berkowitz & Packer, 2001; Cimermanová, 2015; Rajendra, 2015). In this respect, the potential of comics in the education and training process emerges as a subject worth researching (Marianthi, Boulodakis & Retalis, 2016). In fact, the use of comics as a tool in education is not new (Owens, Eno, Abrams & Bedney, 2020). The basis of using comics in education is based on the binary coding theory of Clark and Paivio (1991). This theory, which supports the importance of images in cognitive operations, is based on the development of recall and recognition by presenting information both visually and verbally (Marianthi et al., 2016).

Comics are generally used as an educational material or activity in a visually enriched format, preserving the features mentioned in the definitions in education and training environments (Akkaya, 2013; Joshi et al., 2019). It is thought that, if comics are prepared in accordance with two sound pedagogical principles, comics will support students' learning. The first is to position stories that might be interesting for students in a certain context, whereas the second is to establish a meaningful bridge between the concepts discussed and the students' real life (Toh et al., 2016).

Since educational comics contain two very rich forms of cultural expression, the arts of literature and painting, students actively participate in the learning process by structuring the gaps between these two panels that require active thinking while reading comics (Rota & Izquierdo, 2003). From this aspect, it can be said that this feature of educational comics is suitable for the constructivist approach model (Topkaya, 2016).

Many educators make use of comics to facilitate a better understanding of a certain subject by employing both linguistic and image systems (Liu, 2004). Comics both improve mental processes, which are the indispensable elements of the cognitive field, and develop aesthetic pleasure in students who are an important element of the emotional field (Akkaya, 2013). Based

on the researchers conducted to reveal the effect of comics in the field of education, the benefits of using comics in the education and training process are shown in Figure 7.
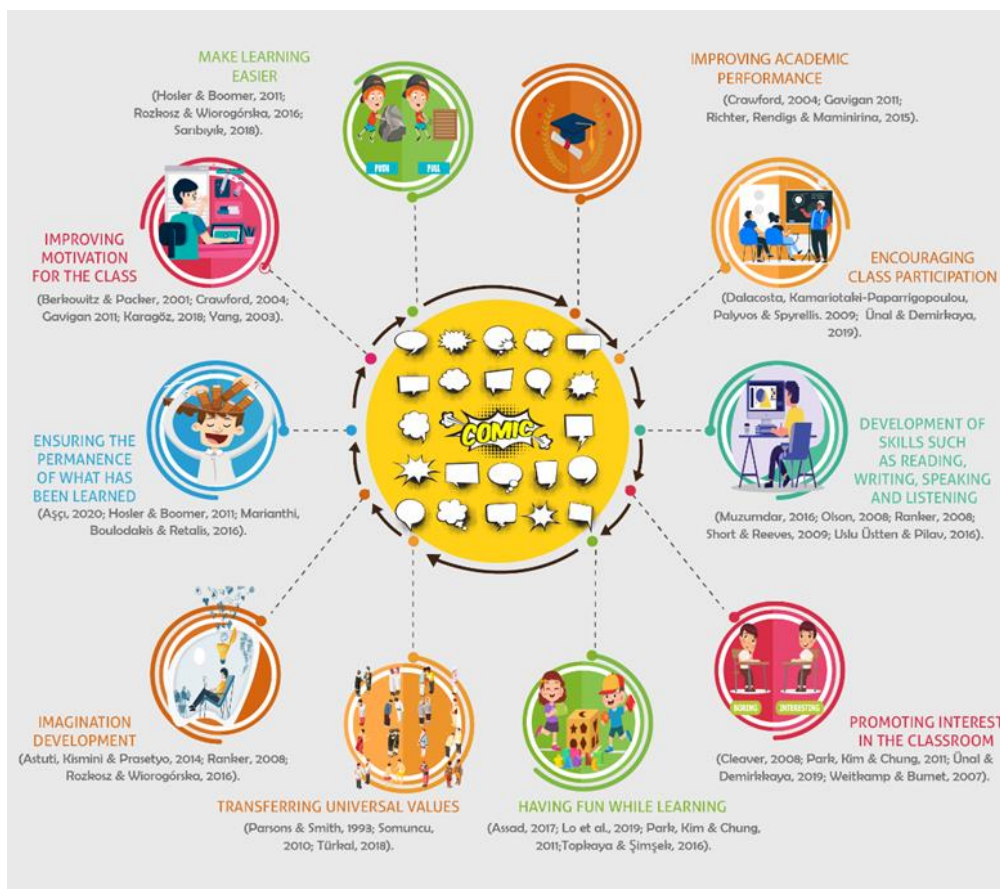
Figure 7. Benefits of using comics in education and training

As can be understood from Figure 7, the inclusion of comics in the education process affects children positively in many related ways. The fact that comics improve the level of children both in terms of skills and cognition is considered to be important for the future lives of children as well as their current experiences.

In addition to their positive contributions to learning and teaching processes, educational comics also have some limitations. Some of these are as follows: limitations arising from educational programs; difficulty in accessing educational comics; inadequate use in the classroom environment due to reasons such as additional burden on teachers (Karagöz, 2018). The small font size in educational comics is also thought to be a deficiency in these materials (Topkaya & Yılar, 2015).

2.2. Comics and Science Education

The benefits of using written teaching tools such as books and journals in science teaching are known by everyone (Falk, Storksdieck & Dierking, 2007). Today, however, these tools fall short of meeting the need to convey the fascination, joy, and utility of science (Hosler & Boomer, 2011; Roswati, Rustaman & Nugraha, 2019). Although science is still taught with written teaching tools based on the traditional education model (Eshach & Fried, 2005), it is actually a discipline that allows the use of new educational resources to encourage students' learning (Morel, Peruzzo, Juele & Amarelle, 2019). Among these new educational resources,

one of the most accessible and useful written tools in science education is comics (Roswati et al., 2019).

Besides being a popular art form especially for children, comics provide a potential environment for science education (Tatalovic, 2009). In this context, comics that address children's interests can be used as alternative resources in science education (Koutníková, 2017; Seitz, 2012; Shurkin, 2015). Comics are very useful tools for educators to teach complex science subjects in a short, appropriate and effective manner, to help explain a world made up of abstract science concepts to students (Morel et al., 2019), and to prevent misconceptions that may occur in students (Asci, 2020). Comics prepared to convey a subject in science education lead students to think about science, which can be used to explain scientific knowledge (Orçan & Kandil İngeç, 2016). Educational comics, which are used for science concepts to get rid of complexity and abstraction, can provide the permanence of knowledge and eliminate forgetting caused by rote learning since they are visually attractive to students (Şengül & Dereli, 2010). While reading comics, students try to establish a relationship between the text and the image and participate fully and actively in the learning-teaching process (Dalacosta, Kamariotaki-Paparrigopoulou, Palyvos & Spyrellis.2009; Rota & Izquierdo, 2003).

In science education, comics are also used to involve students in complex hypothetical scenarios before the real physical classroom experience (Upson & Hall, 2013). Olson (2008) and Tilley (2008) found that using comics improved science literacy by increasing students' opportunities to read and discuss science topics. For example, a science teacher who would like his students to have a sufficient understanding of the nature of science and to be science literate can explain the process of creating scientific knowledge by using comics or use comics as documents to shed light on the relevant period. Figure 8 shows an example comic book.

Figure 8. An example comic book (Akgül, 2016)

Comics to be used in science education should have three significant characteristics which are humour, visualizing learning and contextualizing learning (Lin, Lin, Lee & Yore, 2015). The humorous aspect of comics helps students to handle the tension in the classroom, to reduce their embarrassment, and to relieve their troubles (Özdemir, 2017). The fact that children both enjoy reading comics and are affected by the visual appeal of the graphic presentation make comics an effective tool in learning scientific concepts (Weitkamp & Burnet, 2007). However, comics are effective in affecting and shaping students' attitudes towards science positively (Hosler & Boomer, 2011). They also support the development of their logical thinking (Rozkosz & Wiorogórska, 2016). However, it is not always easy to find ideal and suitable comics that can be used as a teaching tool in science education. While the content of some

comics is not proper for the culture of students, the content of some may not be suitable for learning science (Özdemir, 2017; Roswati et al., 2019). In this case, it may be necessary for teachers to prepare the teaching material to be used by themselves.

At this point, it will be useful to focus on some characteristics that need to be considered while preparing comics in science education.

- Scientific information in speech bubbles should be short and clear in order to increase the effectiveness of comics.

- The drawings of the comics to be used in science education should be simple and should be associated with the objectives of the lesson.

- The characters and texts in the comics to be used in science education must be related to daily life.

- Comics should be prepared within a fiction and should have some basic characteristics such as place, time, and character support.

- It is preferred that the comics to be used in science education are short and consist of 3 to 5 frames.

- In order to reveal whether students have acquired the desired scientific knowledge or not, a discussion environment where opinions can be expressed freely should be created and questions should be asked where opinions can be evaluated (Cantek, 2016; Kireçci, 2008; Özdemir, 2010).

In Figure 9, three separate sections of comics prepared with drawing for science lesson are given.

Figure 9. Three separate sections of comics prepared with drawing for science lesson

When looking at the sample sections in Figure 9, it is seen that different science concepts and events are discussed (Volcanoes, importance of forests, and weather events). It is understood that the comics were created by combining the texts and images effectively, reflecting the emotion of the characters through body language, drawing speech or imagination bubbles, and reflecting the relevant scientific subject correctly.

In general, studies on the use of comics in science education show that comics are an exciting tool to increase the interaction with science (Farinella, 2018a; Shurkin, 2015). In these studies, although the effect of comics in science teaching is mentioned, the quantitative effects of comics have not been explored to a large extent (Farinella, 2018b). From a more general

perspective, the common result of those studies on the use of comics in science education is that science is important and worth introducing through comics (Tatalovic, 2009).

2.3. Educational Comic Book Examples Which Can Be Used in Science Education

In this section, examples of comics that can be used as alternative teaching materials in science education will be introduced.

2.3.1.   Fen Öyküleri (Science Stories)

In the relevant book, the author presents his science stories to the reader in single-page comic sections. Figure 10 contains three examples of comics in the book.
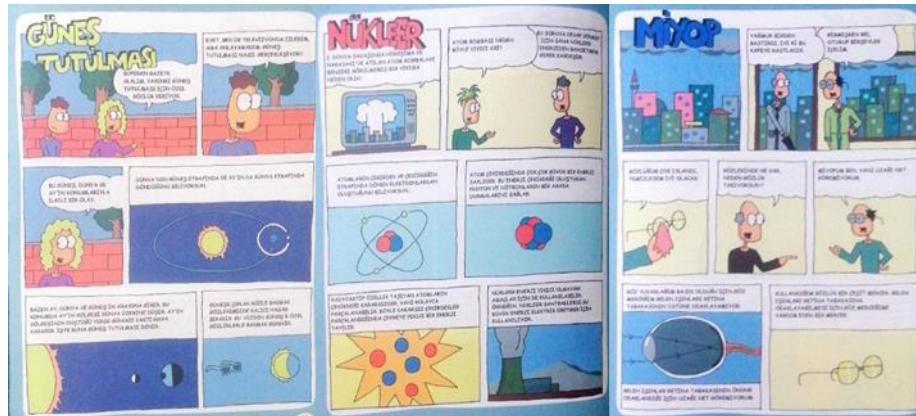
Figure 10. Fen Öyküleri (Science Stories) (Özdemir, 2006)

Figure 10 shows examples of comics under the titles 'Solar Eclipse', 'Nuclear Energy' and 'Myopia'. A striking point in the book is that the science stories are selected from concepts and events related to daily life. It is thought that the objective of establishing a connection with science concepts in daily life and explaining this with comics is to reveal the fun aspects of science and to make readers realize how much it is in our lives.

2.3.2. Robotik ile Bilim Çizgi Roman Serisi (Science Comics Series with Robotics)

This series, which consists of 8 books, examines magnets, energy, force and motion in our bodies, matter, volcanoes, and weather events and recycling, and focuses on the stories of two brothers who are interested in science and discovering science in real and daily life. Figure 11 contains a 3-page section of the "energy" book.

Figure 11. A three-page section from the book entitled Robotik ile bilim çizgi roman serisi-2 enerji (Science Comics Series with Robotics-2 Energy) (Öncü, 2020)

In the comic book in Figure 11, the combination of text and visual elements stands out. In this book, which makes it easier for readers to find something from themselves with the

selection of child characters, science concepts which are perceived as difficult are also reflected in an entertaining way.

2.3.3. Bilimin Çizgi Romanı (Comics of Science)

There is a total of 26 books in this comics series, and in this way, it is aimed for children to grasp the basics of Science and to explore the world of science in a fun way. When we look at the subjects discussed in this series, it is seen that they are selected from a wide range of subjects from electricity to heat, from magnetism to gravity, and from systems to life cycles. Figure 12 contains sections of the comics in three separate books in the series.

Figure 12. Sample sections in three separate books in Bilimin Çizgi Romanı (Comics of Science) (Midthun & Hiti, 2016a; 2016b; 2017)

In Figure 12, there are one-page sample sections from "matter and properties", "structure and classification of plants" and "sound" books, respectively. In each book, a main character is determined in relation to the subject, and the story is given over that character. Every concept mentioned by this main character in the story is explained in the glossary section at the end of the book.

2.3.4. Dünyaya Yön Verenler Serisi (Those Shaping the World' Series)

This series consists of 5 books including scientists such as Issac Newton, Albert Einstein and Aziz Sancar. In each book, a short journey is made to the lives of scientists covered in that book. Figure 13 contains a sample section from the book "Albert Einstein".
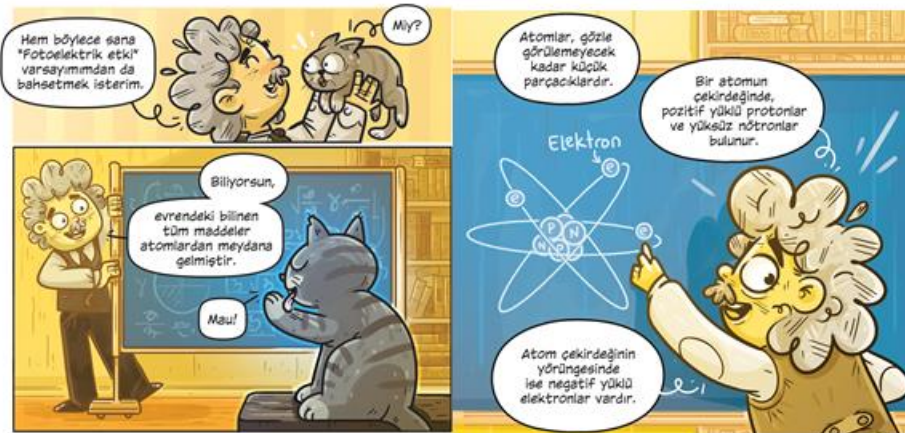
Figure 13. A sample section from the book 'Albert Einstein' (Akgül, 2017)

Figure 13 shows that an entertaining narrative style was adopted in the comic book named Albert Einstein. In this comic book drawn by the author, scientific subjects such as space-time

relationship, photoelectric effect, Brownian motion and energy are presented in a simple but understandable language from Einstein's mouth.

3. Conclusion and Recommendation

In the 21st century, educational comics have become a trend again with its power to guide students to acquire concepts in the education and training process. The complex combination of image and text and the harmony they reveal create a new context with the story they tell. In this respect, it is thought that educational comics go one step ahead of traditional textbooks. The integration of comics with teaching activities will open a new window to students' imagination and thus contribute to their creative thinking processes. In addition, these visually enriched teaching materials are considered to be important in developing children's visual perception skills and preparing them for the future world. For this reason, it is thought that the relationships students establish with comics should not be ignored.

In science classes there are huge number of concepts that are abstract and difficult to conceptualize for students and real challenges for teachers to teach. However, today, teachers, experts, academics and even parents discover numerous ways to make the educational process fruitful, joyful, interactive and memorable for the learners. Educational comics are among the most easily accessible and affordable resources to use in the classes for teaching any subject effectively. Therefore, educational comics that enable students to be interested in an academic subject can also be used easily in science education. While using educational comics in science education, special attention should be paid to the blending of entertainment or excitement elements with scientific knowledge. In these comics, it is absolutely necessary to adhere to the gains in the curriculum. From this perspective, it is thought that transferring scientific knowledge to students in an interesting way will be effective in terms of students' perception of science subjects, with which they often have a difficulty, with a clearer meaning in a more interesting way.

Choosing the topics of educational comics to be used in science education from daily life will enable students to find a harmony between their life activities and school experiences. By combining visual information with verbal explanations, the permanence of the information acquired by students will increase, and they will participate more actively in science lessons with this interesting teaching tool. This will affect students' science learning and contribute to their learning more meaningfully. In this way, it is thought that possible misconceptions that may occur in students can be prevented. At the same time, including information on social problems including science and technology in educational comics will increase students' science literacy. Considering their contribution to the education and training process, it is recommended to include educational comics in different courses, especially in science.

In this study, various samples and ideas are presented to increase awareness about how comics can be made use of in science education. The documents presented shows comics can easily be used for entertaining and educating purposes in science classes. In some documents this feature of comics makes them true edutainment tools to consider as alternative education tools. Researchers, teachers and academics may conduct deeper and wider researches on the types of comics, adopting them in to educational settings in relation with different educational theories and practices.

4. Conflict of Interest

The author declares that there is no conflict of interest.

5. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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AN INVESTIGATION ON THE VIEWPOINTS OF STUDENTS, TEACHERS, AND PARENTS ABOUT HOMEWORK IN PRIMARY SCHOOLS

Case Study

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Abstract

The study aimed to scrutinize the viewpoints of primary school teachers, students, and parents about homework in various parameters such as types, frequency, subject and functions of homework. In the study, the case study design based on the qualitative research method, was utilized. The participants comprised 32 teachers, 36 fourth-grade students and 28 parents from different primary schools in Erzurum, in the east of Turkey. The data were collected via semi-structured interview forms, and were processed using the content analysis method. The findings of the study released that although all participant students, most teachers and parents said homework increased the academic success, a closer look in to their responses to different interview questions illustrated that all of the participant groups also had some negative opinions about the homework in primary schools. The students reported that the most homework covered problem-solving tasks, and the least was practice with musical instruments. The majority of students stated that they were given sufficient amount of homework every day. It was also found out that the most popular subject of the participant students was math and the least favored one was music.

Keywords: homework, teacher, student, parents, primary school, school subjects

1. Introduction

Education is a process involving several complex and interrelated variables. One of the main objectives of this process is to attain successful outcomes. These outcomes may be cognitive, affective, or behavioral. However, in terms of educational curricula, the main objective is to obtain some pre-determined academic achievements, which are expected to be reflected via student's work. As a consequence, teachers tend to use many different methods to improve the academic success, including homework. "Homework" is generally defined as "the schoolwork brought home" (Corno, 1996).

The answers to the question of whether homework improves academic achievement are quite controversial. While some studies argue that homework increases success, others claim that it does not or does only at certain grade levels. Farrow, Tymms, and Henderson (1999) point out that giving homework once a month from each basic course in primary schools improves the homework results. Also, it has been found that homework is effective in increasing success, provided that it does not take too much time. This leads to what they called the 10-minute rule: with each increase in grade level, a ten-minute increase can be made, but even in the top grades, no more than two hours of homework should be assigned (Cooper, Robinson, & Patall, 2006). Cooper (2007), state that homework should be limited to 15 minutes

for the first years of kindergarten and primary school. In some studies, conducted at the primary level, similar results have been obtained relative to the studies conducted at other levels. Eren and Henderson (2011) have determined that homework increases success, particularly in Math and Science, but did not have a significant effect on other subjects. Some meta-analysis studies have revealed that homework given in various courses increases academic success (Ciğerci,& Şentürk, 2016; Fan et al, 2017). Also, it was seen that there are relationships between homework purposes, course achievement and homework quality (Rosário et al, 2018).

Cooper, Lindsay, Nye, and Greathouse (1998) report that parents' estimates of the amount of the time students spent on homework are not significantly correlated with school achievement. In a similar study, although the correlation between parents' predictions of their children's mathematics performance and their children's actual mathematics performance is significant, parents significantly overestimate their children's performance. (Pezdek, Berry,& Renno, 2002). These results also show that the work of children cannot be observed correctly by their parents. The need for a more comprehensive and multi-dimensional examination of the effects of homework on academic achievement has emerged. The versatile relationships of many variables, including the amount of homework and time spent, have been put forward. Valle et al (2016) reveal that academic achievement is positively associated with the amount of homework completed; the amount of homework completed is related to the homework time management; homework time management is associated with the approach to homework; and the approach to homework is related to the student's academic motivation (i.e., academic goals).

It may not be correct to make one-way evaluations about homework. It will be useful to examine the impact of homework not only on students' academic achievement, but also on affective characteristics and behavior. Cooper, Lindsay, Nye, and Greathouse (1998) note that a high amount of homework negatively affected students' attitudes towards lesson in certain classes. Apart from this, there are also studies that examine students' attitudes towards homework of a particular lesson. Akçöltekin and Doğan (2013) examined students' attitudes towards homework in biology lessons and in their study, it was determined that 9th grade students have a positive attitude towards biology homework. In the study of Sarıgöz (2009), 9th grade students state that when they do their homework about chemistry lessons on their day or time, they reinforce the subjects they are working in the school, understand the subjects better, understand and motivate the lessons better. Some studies have examined the motivation of students towards homework and concluded that it differed in terms of internal and external dimensions. Yıldız and Kılıç (2019) conclude that students' internal (autonomous) motivations for homework are higher than their external (control centered) motivations. This situation is desired when it is evaluated in terms of self-determination theory. In some studies, the opinions of students, parents, or teachers about homework have been gathered. In these studies, it is stated that homework improves students' success, can contribute to students' self-cognition, homework can work in daily life, and that students' positive attitude towards their teachers can encourage them to do homework (Özer & Öcal, 2013; Matei, & Ciasca, 2015; Duru & Çöğmen, 2017; Gedik, Altıntaş, & Kaya, 2018). In the study of Hong, Milgram and Rowell (2004), a model with many stakeholders of education ss proposed in order to carry out this process efficiently. The current research is important as it deals with the views of all three groups in terms of different dimensions. In addition, this study is important because it evaluates the thoughts of these groups regarding homework in terms of both academic achievement and affective processes.

Based on the aim of this study, the following research questions are generated:

1) What are the viewpoints of teachers, students, and parents about the influence of homework on their children's school success?

2) What do teachers, students, and parents think about homework?

3) What do students think about the homework types as well as its frequency, amount, and the subjects?

4) What are the parents' observations like about their children's attitude towards homework?

2. Method

2.1. Research Design

The study utilized the case study design as one of the models in the qualitative research method. Case studies are defined as an in-depth analysis of one or more events, environments, programs, social groups, or interconnected systems (McMillan, 2000). A single unit is examined in a case study. This unit may be an individual, group, site, class, policy, program, process, institution, or community (Ary, Jacobs, & Razavieh, 2010). Since the concept of homework was examined in depth, the study could be conducted as a case study.

2.2. Participants

The participants of the study consisted of 36 primary school students; 32 primary school teachers in different primary schools, and 28 parents of the students in Erzurum, a large province in the east of Turkey. Participants were determined by simple random sampling model (Cohen, Manion, & Morrison, 2007). Simple random sampling involves the random selection of individuals from the realistic population as a whole (Lodico, Spaulding, & Voegtle, 2006).

Certain criteria and limitations were taken into consideration in the selection of the participant students of the 4th grade with the equal number of girls and boys. The parents were selected among those whose children were in the same school. Teachers were teaching in the same schools. They were between 22-50 years old and they had 1-21 professional years of experience (1-21). Class sizes were in the range of 10-48. Schools were selected from different socio-economic environments.

2.3. Data Collection Process

Interview technique has strong features in terms of being suitable for measuring features, providing the opportunity to obtain in-depth information and being continuously monitored (Teddlie, & Tashakkori, 2019). Semi-structured interviews were prepared in order to gather the opinions of the participants about homework. This format is well suited for investigating participants' perceptions and views on complex and sometimes sensitive issues. This technique also allows for further research and clarification of answers (Barriball & While, 1994). During the process of creating interview forms, expert opinions were taken and updates were made via a pilot implementation. Pilot scheme should be done for many processes such as testing the adequacy of measurement tools and collecting preliminary data (Van Teijlingen, & Hundley, 2010). In addition, validity and reliability analyses were administered. Interviews were conducted face to face by the researcher, and were recorded giving a nick name to each interviewee.

In the data collection process, firstly the individuals to be interviewed were identified and informed about the research. Volunteers were determined for the interview and the meeting time was determined. Family consent forms were collected before the interviews, then the students were informed about the content of the questions and the interviews started with some relaxing questions. In addition, all the interviewees were assured about the confidentiality of the study.

2.4. Analysis of Data

The responses were processed using content analysis. According to Cohen, Manion, and Morrison (2007), content analysis is a research technique consisting of editing, summarizing, comparing, and interpreting texts and is reproducible, observable, and systematic. The main task of content analysis is to collect and interpret similar data in a comprehensible manner (Yıldırım,& Şimşek, 2016). In the analysis of the data, member checking was done with the people determined from each group and the codes obtained were updated. Thus, reliability was tried to be increased.

3. Results

The results obtained in the study are presented as the answer to each research question.

3.1. Thoughts on Whether Homework Increases Success

The thoughts of students, teachers, and parents on whether homework increases success are shown in Table 1.

Table 1. *Thoughts on whether homework increases success*

	Thought	n	%
Students	Increases	36	100
	Does not increase	0	0
Teachers	Increases	22	68.8
	Does not increase	10	31.2
Parents	Increases	25	89.2
	Does not increase	3	10.8

As seen in Table 1, all students (n=36), a majority of the teachers (n=22), and a majority of the students' parents (n=25) think that homework increases success.

3.2. Thoughts of Teachers, Students, and Parents about homework

The responses obtained from the interviews are categorized as positive and negative separately for each sample group. Although the students, teachers, and parents have many different thoughts, the most frequently mentioned opinions are presented in Table 2.

Table 2. *Most frequently mentioned thoughts about homework*

	Positive Thoughts	Negative Thoughts
Teachers	Students gain responsibility and task awareness.	It causes the student to cool down from school and education.
	It gives students a sense of accomplishment.	If given too much, it causes the student to get tired.
Students	I think homework is fun.	It takes a lot of time.
	I'm satisfied with homework	Homework makes me tired.

Parents	It improves success because it reinforces the subjects learned in school and solidifies them into memory.	It does not increase success; a hard-working student is already successful at school.
	Taking responsibility and spending spare time on homework increases success.	Too much homework makes the student tired and bored, which is useless.

In addition to the aforementioned views, teachers express other positive and negative thoughts. While positive thoughts are generally related to the studying process, the negative thoughts were related to the affective structure of the students.

T3: *"Homework gives students the habit of planned work and increases the permanence of learning."*

T11: *"Giving too much homework limits the creativity of the students and may encourage them to lie."*

The students provided shorter answers about homework and evaluated it in terms of affective aspects, such as liking it or not and the difficulties posed by the assignments. Students generally expressed negative thoughts about their homework.

S23: *"Too much homework is given."*

S16: *"I'm having a hard time while doing homework alone."*

Parents' thoughts were generally related to the attitudes and behaviors expected from the students.

P23: *"The assignments help the students to work independently, taking responsibility and gaining working discipline and self-control."*

Parents also stated that the homework must be checked, and when the assignments are not checked by the teachers, this has negative implications for the student.

P2: *"The assignments should be checked; otherwise students do not care about them."*

3.3. Thoughts of the Students on the Assignment Type, Frequency, Amount, and Subject

The students' responses about the type, frequency, and amount of their homework are given in Tables 3, 4, and 5.

3.3.1. Type of homework given by teacher

Table 3. *Thoughts the students on the type of homework*

Homework Type	n
Problem solving homework	31
Tests as homework	28
Writing homework	27
Project research homework	23
Reading and summarizing homework	19
Memorizing homework	10

Interview-observation homework	8
Painting and designing homework	7
Activity-ability homework (dancing, sport, etc.)	3
Music homework (playing an instrument)	1

As can be seen above, the most frequently assigned homework type is problem solving. In addition, it is observed that the homework type least frequently given is music. In general, it is seen that students are given homework related to the basic subjects such as math, Turkish, and Science. It is observed that homework is rarely given in artistic and sports fields.

3.3.2. Thoughts of students on the frequency of assignments

Table 4. *The frequency of homework given by teachers*

Frequency of Assignments	n	%
Homework is given every day.	25	69.4
Homework is given 2-3 times a week.	10	27.8
Homework is given rarely.	1	2.8

The table shows that the majority of teachers (n = 25) give homework every day. This is followed by the teachers who give homework 2-3 times a week (n = 10). There is only one teacher who gives homework rarely.

3.3.3. Thoughts of students on the amount of homework

The students' responses on how they evaluate the amount of homework given by their teachers are presented in Table 5.

Table 5. *Amount of homework given by teachers*

Amount	n	%
Adequate	28	77.8
Little	4	11.1
Much	4	11.1

As shown in Table 5, the amount of homework given by teachers is considered sufficient by most students (n=28). The number of those who think that the amount of homework given by teachers is either more or less than adequate is quite low (n = 4).

3.3.4. Popular and unpopular homework subjects

The students' answers about their favorite lesson assignments are illustrated in Table 6.

Table 6. *Popular and less popular homework subjects*

Subject	n
Mathematics	31
Religious culture and moral knowledge	30
Turkish	28
Sciences	25

Visual arts	20
Social studies	19
Foreign language (English)	18
Traffic safety	17
Human rights, citizenship, and democracy	15
Music	14

Table 6 shows that the most popular assignment for students is math. In addition, the less popular subject for students is music. It is seen that these findings overlap with the findings in Table 4.

3.4. Student Homework Behaviors as Observed by Parents

The parents' list about the behaviors of their children while doing their homework is given in Table 7.

Table 7. *Student homework behaviors observed by parents*

Behaviors	n
Doing it in a pleasant and eager way.	15
She/he does not want to do it alone.	12
She/he is bored and tired of it.	10
She/he does it cheerlessly and reluctantly.	8
She/he does not want to do the homework.	6
She/he says she/he does not understand the homework.	4
She/he states that homework is very easy.	4

As is seen, several negative thoughts are expressed, e.g. that the students do not want to do it alone (n = 12) and are bored and tired of it (n = 10), although the main observation is that the students do their homework in a pleasant and willing way (n = 15). Apart from these, there are also thoughts expressed by a single parent. Parents also report that their children think generally homework is very difficult and takes a lot of their time, they cannot finish homework, they prefer to use the computer, etc., they get bored because there is no time to play, they do not play without doing their homework, and their teachers do not check their homework (n = 1).

4. Discussion and Conclusion

This study presents the thoughts of parents, teachers, and students about homework in primary schools. The results show that all three groups believe that homework increases success but they have certain negative perceptions about it as well. The meta-analysis by Ciğerci and Şentürk (2016) report that homework assignments has a small but positive effect on students' academic achievement. In another meta-analysis study, it is determined that homework increases academic success in Math and Science courses (Fan et al, 2017). In terms of groups, students (Brenner, 2018); teachers (Tam, & Chan, 2016; Rosario et al, 2019) and parents (Lukerstuen, 2019) are found to express their views on the positive impact of homework. It can be said that these results conform with the thoughts of the participants in this research. The stated opinions indicate that the result may be due to the types, quantity, and content of the assignments.

The most important factor in the successful impact of homework is the teacher. Teachers not only assign homework, they also design homework. Designing homework requires teachers to consider the purposes, format, and other elements of assignments that will engage students and help them succeed (Epstein, & Van Voorhis, 2001). This process includes the type, amount, structure and frequency of the assignment. Farrow, Tymms, and Henderson (1999) stated that if homework is given once a month in each basic course, success will increase, while at higher frequencies it will fall. Besides, using homework in a positive manner to improve educational achievement is a challenge for teachers (Hong, Milgram, & Rowell, 2004). Nevertheless, a significant number of students stated that their teachers give homework every day. This was followed by those who stated that homework was given several times a week. Therefore, the question of how high quality and effective these homework is given and how effective this process was carried out came to mind. The view expressed by parents that teachers do not control homework points to an important problem. In a study, it was asserted that teachers' control of homework helps students give more importance to homework and improves student-teacher interaction (Aladağ, & Doğu, 2009). Therefore, this may be an important reason for the negative attitudes and behaviors observed in students about homework. Because, it was concluded that teachers' being more sensitive about homework, caring about students, and evaluating students' work by checking homework regularly will improve positively students' attitudes towards homework (Akçöltekin, & Doğan, 2013).

The most frequently assigned homework type is problem solving. However, it is doubtful whether the problem-solving assignments are given in accordance with the "problem solving" method. In the study by Öztürk (2004), very few teachers state that they used this method. Our study shows that the least often assigned type of assignment was music. This is thought to be due to the lack of teachers' playing skills. Researches show that elementary school teachers do not receive a sufficient level of music education at university (Altun, & Uzuner, 2018) and do not consider themselves sufficient in music lesson practices (Kocabaş, 2000). An important result of the research is that the type of homework given by teachers is in line with the lesson homework that students like and dislike. Students' favorite course assignment is mathematics, and the most disliked subject for homework is music. Therefore, it can be concluded that the preferences and tendencies of the teachers affect the students' perspectives. This issue can be investigated in future studies.

The amount of homework and the time the student spends on homework are factors related to student performance and the desire to do homework (López et al, 2013). In the research, the majority of the students stated that the amount of homework given was sufficient. This result is supported by the results of similar studies (Cooper, Lindsay, Nye, & Greathouse, 1998; Farrow, Tymms, & Henderson, 1999). In general, it is important that the amount of homework remain low and that the homework not limit the time allocated for students' personal development and entertainment.

Parents often report negative opinions regarding the behavior of students in the most homework process. Opinions come forward as students are bored and do not want to do it alone. In a study, most of the parents state that homework created a power struggle with their students (McIntyre, & Marion, 2019). However, parents also have responsibilities in eliminating the negative attitudes and behaviors of students about doing homework. Cooper (2007) provide parents with five suggestions: "Be a stage manager, be a motivator, be a role model, be a monitor, be a mentor". These five tips will perhaps turn children's learning habits into a positive one. The reasons why homework turns into a problem must be deeply investigated.

5.1. Recommendations

Under the guidance of adults who challenge their intellectual growth, homework provides students with the training needed to develop adaptive achievement beliefs and behaviors (Bempechat, 2004). It is important that the parents provide the necessary guidance for the students in doing their homework and help them cope with the difficulties they face during this process. It may be useful to inform parents and support their contributions to the process. Apart from this, it can be recommended that teachers be advised to check assignments, provide feedback on the homework. An investigation indicates that students felt more confident on tests, felt they are better independent learners, and have stronger study skills when they are graded on their homework as a result of feeling the necessity to complete it (Brenner, 2018). It is important that the teacher is sufficient and equipped in this process. The fact that teachers are ready for the educational process in terms of cognitive and affective, and being ready in all aspects of the school environment will contribute to an effective education process (Yıldız, 2020). Also, it can be recommended that teacher assign small amounts of homework, takes into account the interests, abilities, and expectations of the students.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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INTERACTION BETWEEN ACADEMIC RESILIENCE AND ACADEMIC ACHIEVEMENT OF TEACHER TRAINEES

Research article

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INTERACTION BETWEEN ACADEMIC RESILIENCE AND ACADEMIC ACHIEVEMENT OF TEACHER TRAINEES

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Abstract

This study sought to explore the interaction between academic resilience and academic achievement as measured by Grade Point Average (GPA). To this end, the Academic Resilience Scale (Cassidy, 2016) consisting of 30 items and scored on a 5-point Likert scale was administered. The overall reliability of the scale was .79 and the reliability coefficients for the three sub-scales were above .70. Student GPAs (M= 2.50, SD= .51) were procured by a self-report item. The sample of the study consisted of 198 preservice English language teachers at a foundation university in Turkey. Descriptive results showed that participants scored highest on reflecting and adaptive help-seeking (M= 3.77, SD= .58). It was followed by perseverance (M= 3.44, SD= .41) and negative affect and emotional response (M= 2.90, SD= .69) dimensions. Moreover, positive correlations were revealed between GPA and perseverance (r= .20, p <.05) and reflecting and adaptive help-seeking (r= .37, p<.01). The results of the multiple regression analysis manifested reflecting and adaptive help-seeking to be the only significant predictor of GPA.

Key words: Academic resilience, achievement, teacher trainees

1. Introduction

According to the statistics provided by the Higher Education Council (n.d.), the number of students suspending or dropping out of their associate or undergraduate studies is on the rise especially in the last decade in Turkey. This statistic can be attributed to certain personal and scholastic factors. Şimşek (2013) reports that gender, attendance, out-of-school work, boredom at school, and disciplinary penalty as personal factors associated with undergraduate dropout whereas faculty type, level of program difficulty, willingness to choose the faculty, satisfaction with social activities and administrative and teaching staff were listed among the scholastic factors. Besides, change of residence and new social environment (Peer, Hillman, & Hoet, 2015; Karahan, Sardoğan, Özkamalı & Dicle, 2005) were among other challenges identified by scholars. In the same vein, Tinto (1996) stated that goal uncertainty, financial difficulties, sense of isolation, and an inefficacy to negotiate the transition between secondary and tertiary level of education or commitment to a degree program as some other possible reasons for student attrition in higher education. Such factors as can lead to disequilibrium, high levels of stress, dissatisfaction, and poor academic performance (Franco Taboada, 2015; Peer, Hillman, & Hoet, 2015) on part of some students.

As a matter of course, while there are students that achieve less and continue to perform poorly and fail, there are also those who turn their academic misfortunes around, flourish, and thrive notwithstanding adversity (Martin & Marsh, 2006). Such students are called resilient. Typically, resilience has been described as the capacity for positive or successful adaptation (Glennie, 2010; Howard & Johnson, 2000; Luthar, Cicchetti, & Becker, 2000; Masten, Best, & Garmezy, 1990; Riley & Masten, 2005; Waxman, Gray, & Padron, 2003) when faced with

hardship. Other scholars have defined it as the ability to cope with (Cassidy, 2016) and pull oneself together, recover, and return to the pre-adversity state (Smith, Dalen, Wiggins, Tooley, Christopher, & Bernard, 2008) in face of challenge and adversity. It is considered as a positive entity with positive effects on an individuals' successful functioning (Bartley, Schoon, Mitchell, Blane, 2010; Cassidy, 2016).

The concept of resilience has received great attention in social sciences research focusing on individuals with adverse life conditions, experiences, or contexts (Masten, 2001), but academic resilience has yet to receive the rightful attention. Besides, as argued by Montero-Hernandez, Levin, and Diaz-Castillo (2014), most studies worldwide have concentrated on samples in unfavorable conditions. Whereas some researchers concentrated on students with socio-economic difficulties (Aydın, 2017; Buslig, 2019; Çokluk, Gül, & Kayri 2016; Gizir & Aydin 2009; Seban & Perdeci 2016; Yavuz & Kutlu 2016), some focused on students at risk (Abukari 2018; Annalakshmi, 2019; Lee 2009; Novotny & Kremenkova 2016; Zuill 2016). There are also studies that centered upon minority (Britton 2018; Gross, 2011; Fallon, 2010; Perez-Brena, Sang, Kuo, Jesus, Updegraff, & Umana-Taylor, Mchale, 2018) and immigrant (Kumi-Yeboah, 2016; Mbindyo, 2011) students. However, as argued by Martin and Marsh (2006), it is relevant to all students since poor performance, adversity, challenge, or pressure are common experiences in educational life. The case for teacher trainees is no different. Besides the academic challenges related to their teacher training program which is characterized by cognitive and emotional demands (Danner, 2014), preservice teachers also attend to practicum in the final year of their teacher training program; which is a challenging task in itself (Durksen & Klassen, 2012).

2. Literature Review

In this section, literature in the field that is related to this study will be covered. In this respect studies that focus on gender differences in academic resilience and research on the relationship between academic resilience and achievement will be reviewed.

2.1. Gender differences in academic resilience

There are studies that focus on gender differences in academic resilience. In a study carried out with 9th and 12th grade students (n=559) in the Midwest, Wasonga (2002) revealed higher resiliency scores for girls. In Sun and Stewart's (2007) study undertaken with 2492 Australian students attending 3rd and 7th grades, significant gender differences were revealed in favor of females in communication, empathy, help-seeking, and goals and aspirations aspects of resilience. Similarly, Mbindyo's (2011) results showed that females were more resilient in a sample of 106 ethnically diverse minority students at an intervention program. McLafferty, Mallet, and McCauley (2012) descriptive results also ascertained that females had higher academic resilience levels among 117 undergraduate students from Northern Ireland. On the other hand, Çelik (2013) found that gender differences in favor of female students among 11th and 12th grade Turkish high school students with respect to resilience sub-factors optimism/conduct of life, communication/relationship building, and being a researcher. In a study that included inductees from a university in the UK, Allan, Mckenna, and Dominey's (2014) four-stage analysis revealed incremental resilience to be more facilitative for female students' academic attainment compared to their male counterparts. In a study carried out with 333 Turkish undergraduates of music education females scored significantly higher in their perception of self, perception of the future and social resources subdimensions (Yokuş, 2015). Significant gender differences were also revealed in favor of females in Kenya by Mwangi and Ireri (2017) and Mwangi, Ireri, Mwaniki, and Wambugu (2018) with a sample of 390 secondary school students. The study of Chisholm-Burns, Spivey, Sherwin, Williams, and Phelps (2019)

also unearthed gender differences in favor of female students on reflecting and adaptive help-seeking dimension of academic resilience among a sample of pharmacy students.

Contrary to aforenamed studies, there are also researches that revealed results in favor of male students. In a study carried out with 402 Australian high-school students, Martin and Marsh (2006) concluded males as more resilient. Similarly, Martin and Marsh (2008) found that male students scored significantly higher among 598 students in grades 8 and 10 at five Australian high schools. In another study with 127 secondary school students Sarwar, Inamullah, Khan, and Anwar (2010) found males to be more resilient compared to their female counterparts. Similarly, in Ulker Tumlu's (2013) study carried out with 735 undergraduate students attending the Faculty of Education of a Turkish University, resilience levels of students differed according to gender in favor of males. In another study carried out in Turkey with 596 undergraduate students, Erdogan, Ozdogan, and Erdogan (2015) ascertained that gender differences in favor of males. Moreover, the gender effects in the same direction were also found to be significant for sub-dimensions being powerful, being entrepreneur, foresight, achieving the goal, being a leader, and being a researcher. In study carried out with 304 12th grade students, Yavuz and Kutlu (2016) also found that females were significantly more resilient.

Moreover, there are also studies that revealed insignificant results with respect to gender differences. For example, using NELS 88 data and including 1803 minority students in grades 8 through 12, Finn & Rock (1997) found no significant differences with respect to gender differences in students' resilience. In the same vein, Özcan (2005) found no gender difference with respect to gender among 152 Turkish high school students. The study of Elizondo-Omana et al. (2010) also found no gender differences regard academic resilience among 113 regular and 69 remedial medical students. In a study performed with the participation of Turkish primary school students, there were no gender-based differences (Baltacı & Karataş, 2015). Cassidy (2015; 2016) also found no gender differences in resilience levels among British undergrad students. In a study conducted in India with 125 students from a public school, Rao and Krishnamurthy (2018) also found indifference between girls and boys with respect their resilience attributes.

2.2 Academic resilience and achievement

Correlational and predictive relationships between academic resilience and achievement are also evident in the literature. For example, in a study carried out in Iran, Abolmaali and Mahmudi (2013) with 384 female high school students of resilience was found to significantly predict academic achievement. Similarly, Foshee (2013) revealed academic resilience as a predictor of academic performance in combination with other affective attributes among college Students in a remedial mathematics course. Likewise, Kotzé and Kleynhans (2013) determined resilience as a significant predictor of academic performance among 789 first-year students at a South African university. In a research undertaken with 420 first-year students at an Australian university, Kwek, Bui, Rynne, and So (2013) found resilience to be a significant predictor of academic performance. In another study, Novotný and Křeménková (2016) determined resilience as a significant predictor of academic performance among 467 students aged between 15 and 21. In Sadoughi's (2018) study, academic resilience had a positive and moderate level of correlation with and also significantly predicted academic performance in a sample of 220 Iranian medical students. In a study carried out with 748 first year students in Spain, Ayala and Manzano (2018), hardiness and resourcefulness dimensions of resilience were found to predict academic performance. Similarly, Rodríguez-Fernández, Ramos-Díaz, and Axpe-Saez (2018) found evidence in support of the predictive influence of resilience on perceived performance among 945 secondary school students in Spain.

On the other hand, in a correlational study carried out with 162 Psychology students at a university in the UK, a positive relation was revealed between resilience and academic achievement (Solomon, 2013). In a study carried out in Kenya, Mwangi, Okatcha, Kinai, and Ireri (2015) also revealed a positive and significant relationship between academic resilience and academic achievement among 390 secondary school students. A significant positive relationship was also established between resilience and academic achievement in the study of Yokuş (2015). Based on PISA 2012 mathematics performance data and including a random selection of 4848 students aged 15, Yilmaz Findik (2016) concluded that almost all the 322 resilient students' mathematics performance was above baseline in Turkey. Moreover, a significant positive relationship between resiliency and reading achievement was determined in the study of Zuill (2016). In a study done by Britton (2018) with high school students with minority backgrounds a weak positive correlation was determined between resilience and achievement. In the same vein, Rao and Krishnamurthy's (2018) study revealed a high positive relationship between resilience and scholastic performance. Hernandez, Escobar, Fuentes, and Eguiarte (2019) too found a weak positive relationship between resilience and achievement in a sample of 288 Mexican students aged between 18 and 25. Likewise, Öz (2019) revealed a weak positive correlation between academic resilience and achievement among 88 preparatory school students of English Language Teaching and English Language Literature. A weak positive relationship was also reported by Trigueros, Aguilar-Parra, Cangas, Bermejo, Ferrandiz, and López-Liria (2019) in their study that included 615 secondary school students attending Physical Education classes. In a recent study conducted by Toprak Çelen (2020), perseverance, negative affect and emotional response, and reflecting and adaptive help seeking as academic resilience sub-dimensions were found to be statistically significant correlates of mid-term averages in a sample of 436 Turkish foreign language preparatory school students. Her study found perseverance as a negative correlate of student success whereas negative affect and emotional response and reflecting and adaptive help seeking were positive correlates.

On the other hand, some studies revealed no interactions between academic resilience and achievement. In Wasonga's study (2002) higher resiliency scores did not ensure an edge in academic achievement. In a study carried out with medical students, Elizondo-Omana, Garcia-Rodrigues, and Guzman Lopez (2007) academic resilience was found not to predict academic success. A similar result was revealed in Elizondo-Omana's (2010) study. Sarwar, Inamullah, Khan, and Anwar (2010), on the other hand, found no correlation between resilience and academic achievement among secondary school students. In a study performed with psychology undergraduates in the UK by Cheng and Catling (2015) also found that resilience was found to not predict achievement. Undertaking a study with 51 Bermuda foster care students aged between 12 and 17, Zuill (2016) found no relationship between resiliency and GPA and resiliency and math achievement. In another study, which was based in Czech Republic, academic resilience did not predict academic performance among 97 international students (Smejkalová, 2018).

As evident from the above discussion of studies, neither the results in gender differences regard academic resilience nor findings on its relationship with academic achievement are conclusive. Besides, there are no studies to our knowledge that focused on preservice English teachers studying beyond their preparatory English language courses. Therefore, the present study aims to investigate gender differences in academic resilience and its interaction with academic achievement by seeking answer to the following research questions:

1. What is the academic resilience make-up of the teacher trainees?

2. Do female and male teacher trainees differ in terms of their level of academic resilience?

3. What is the relationship between academic resilience and academic achievement?

4. Can academic achievement be predicted by any dimension of academic resilience?

3. Methodology

In this section, the research design, setting, participants, data collection instruments, procedures for data collection and analysis regard the current study will be described.

3.1. Research design

A cross-sectional survey research design was adopted in this study. It provides for the investigation of a construct by addressing questions related to facts or opinions about this construct to a sample from a larger population using several means of data collection like questionnaires, interviews, and observations (Griffee, 2012) that are administered at one point in time (Cresswell, 2012). To that end, a questionnaire was administered to a group of preservice English teachers to search answers to the proposed research questions.

3.2 Setting and participants

The current research was carried out with 198 undergraduate students. The students were enrolled in the English Language Teaching program of a foundation university in Ankara, Turkey. Participation in the study was on a volunteer basis. Participants were admitted to their undergraduate program via their scores on the centrally administered university entrance exam. Therefore, it is fair to consider them as a homogeneous group. Among the 198 students that took part in the study, 137 (69%) of them were female whereas 61 (31%) of them were males and their ages ranged between 18 and 34 (M= 21.65, SD= 2.54).

3.3. Instruments

A questionnaire that consisted of two parts was utilized as a data collection instrument in the study. These were the demographic information form and the academic resilience scale (Cassidy, 2016). Details regarding the instruments will be discussed below.

3.3.1. Demographic information form

The demographic information form was the first section of the questionnaire. It asked participants to state their age, gender, and grade point average (GPA). GPA was utilized as a measure of achievement since it is acknowledged as a reliable standard of undergraduate academic success (Beatty, Walmsley, Sackett, Kuncel, & Koch, 2015).

3.3.2. Academic resilience scale

The academic resilience scale is an instrument developed by Cassidy (2016) that reflects the construct's multidimensional nature. It aims to quantify academic resilience levels of students concerning their responses to academic hardship and is composed of 30 items scored on a 5-point Likert scale ranging from unlikely (1) to likely (5). It consists of 14 items related to perseverance, 9 items about reflecting and adaptive help-seeking, and 7 items on negative affect and emotional response. The reliability coefficient for the perseverance, reflecting and adaptive help-seeking, and affect and emotional response sub-dimensions were .71, .76, and .72 respectively. Overall, the overall Cronbach's reliability coefficient for the scale was .79. The reliability coefficients for the sub-dimensions and the overall scale were acceptable (Hulin, Netemeyer, & Cudeck, 2001).

3.4. Procedures for data collection and analysis

Data were collected in the Spring semester of the 2018-2019 academic year from students studying at the English Language Teaching department of a foundation university who wished to participate in the study by distributing and recollecting printouts of the demographic information form and Academic Resilience Scale (Cassidy, 2016) during class hours. Data

were collected in the Spring semester to make sure that the GPAs of first-year students were determined. Emerging data was entered into SPSS 22 and checked for possible entry errors and missing values. There were no entry errors. Considering the missing value analysis, missing values for scale items were replaced by the mean values of remaining responses to the items. Next, measures of central tendency (mean) and dispersion (standard deviation) were calculated and used to specify the GPAs and resilience levels of the participants. Prior to analyzing the data for possible gender differences in academic resilience dimensions, assumption checks were carried out to determine the appropriate type of analysis as specified by Morgan, Leech, Gloeckner, and Barrett (2011). Data were considered as independent since genders are not matched. The variances of the dependent variables in the gender categories were ascertained to be equal via the Levene's test and the boxplots and stem-and-leaf plots showed that the dependent variables were normally distributed within each category. Therefore, an independent samples t-test was used to determine whether female and male participants differed in regard to different dimensions of academic resilience. Associational relationships between GPA and academic resilience dimensions were determined via the Pearson product moment correlation because the data was normally distributed, free of outliers, and variables had a linear relationship (Morgan, Leech, Gloeckner, & Barrett, 2011). Lastly, the causal relationships between types of academic resilience dimensions and GPA were uncovered using a bivariate linear regression analysis after the data was found fit in prior analyses.

4. Results

This research submits an attempt to unearth gender differences in GPA and academic resilience among preservice English teachers, to analyze the relationships between academic resilience and GPA, and to evince the role played by academic resilience in predicting GPA. Within this scope, the findings of the research are presented below.

4.1. Descriptive findings

In this section descriptive data regards students' academic achievement levels and academic resilience levels will be presented.

4.1.1. Academic achievement

Descriptive data with respect to academic achievement levels of the participants as measured by their self-reported GPA showed that the academic achievements of students were above average (M= 2.50, SD= .51). Furthermore, GPAs of female preservice teachers (M= 2.55, SD= .48) were higher than that of their male counterparts (M= 2.36, SD= .56).

4.1.2. Academic Resilience

In order to reveal the academic resilience make-up of the participants, descriptive statistics with respect to three types of academic resilience were computed. The results are presented in Table 1.

Table 1. *Descriptive statistics for resilience types*

	Whole		Female		Male	
Type of resilience	M	SD	M	SD	M	SD
Negative affect and emotional response	2.90	.69	2.88	.64	2.96	.79
Perseverance	3.44	.41	3.44	.38	3.44	.48
Reflecting & adaptive help-seeking	3.77	.58	3.80	.55	3.72	.64

N= 198, n_{female}= 137, n_{male}= 61

As it can be observed from Table 1, an analysis of the scores of the whole population showed that reflective and adaptive help-seeking (M= 3.77, SD= .58) was the highest resilience type followed by perseverance (M= 3.44, SD= .41). Moreover, negative affect and emotional response (M= 2.90, SD= .69) was the least dominant resilience type exhibited among variables of academic resilience. On the other hand, when the gender-wise descriptive findings regard academic resilience types are examined, males (M= 2.96, SD= .79) scored higher on negative affect and emotional response compared to their female counterparts (M= 2.88, SD= .64). With respect to perseverance the mean values of females (M= 3.44, SD= .34) and males (M= 3.44, SD= .48) were equal. With respect to reflecting and adaptive help-seeking behaviors, on the other hand, female participants (M= 3.80, SD= .55) scored higher than male participants (M= 3.72, SD= .64).

4.2. Inferential Findings

In this section results of the analyses regards, gender differences regard academic resilience, the relationship between academic resilience dimensions and student GPA, and the determinant(s) of GPA will be presented.

4.2.1. Gender differences with respect to academic resilience

To ascertain gender differences in academic resilience, first the descriptive statistics were computed. Relevant statistics are presented in Table 2 below.

Table 2. *Descriptive statistics for academic resilience types with respect to gender*

Dimensions of resilience	Female		Male	
	M	SD	M	SD
Negative affect and emotional response	2.88	.64	2.96	.79
Perseverance	3.44	.38	3.44	.48
Reflecting & adaptive help-seeking	3.80	.55	3.72	.64

N=198

To determine whether the gender differences in motivation types observed above are statistically meaningful, an independent samples t-test was conducted, and the results are presented in Table 3.

Table 3. *T-test results for gender differences with respect to resilience dimensions*

Dimensions of	Female		Male		t	Df	p
	M	SD	M	SD			
Negative affect and emotional response	2.88	.64	2.96	.79	.60	196	.55
Perseverance	3.44	.38	3.44	.48	-.11	196	.99
Reflecting & adaptive help-seeking	3.80	.55	3.72	.64	.72	196	.47

N=198

An examination of Table 3 shows that there were no significant gender differences in perseverance (female M= 3.44, SD= .38; male M= 3.44, SD= .48), t(196)= -.11, p > .05); reflecting and adaptive help-seeking (female M= 3.80, SD= .55; male M= 3.72, SD= .64), t(196)= .72, p > .05); and negative affect and emotional response (female M= 2.88, SD=.64; male M= 2.96, SD= .79), t(196)= .60, p > .05).

4.2.2. Relationship between academic achievement and academic motivation

To assess the relationship between academic achievement represented by participants' GPA and academic resilience, Pearson's correlation coefficients were computed. Results of the analysis is presented in Table 4.

Table 4. *The relationship between academic achievement (GPA) and academic resilience*

	1	2	3	4
1. GPA	1			
2. Negative affect and emotional response	-.12	1		
3. Perseverance	.20*	.31**	1	
4. Reflecting & adaptive help-seeking	.37**	-.01	.65**	1

*p<.05, **p<.01, N=198

As it can be observed from Table 4, GPA correlated positively with perseverance (r = .20, p < .01) and reflective and adaptive help seeking (r = .37, p < .01).

4.2.3. Predictors of academic achievement with respect to types of academic resilience

After establishing statistically significant correlations between academic achievement as represented by students' GPAs and perseverance and reflecting and adaptive help-seeking a regression analysis was conducted after determining that data was fit to implement the analysis with respect to normality, linearity, multicollinearity, and homogeneity of variance. Results of the regression analysis are presented in Table 5 below.

Table 5. *Regression analysis for motivational predictors of achievement*

Predictor	B	SE B	B	T	P
Perseverance	-.01	.01	-.06	-.56	.58
Reflecting & adaptive help-seeking	.04	.01	.41	3.68	.00

$F(2, 195)= 9.71$, p= .00, adjusted R^2= .12, R^2= .14, N=198

As it can be observed in Table 5, among the resilience types entered into the model, reflecting and adaptive help-seeking was determined to be the only predictor of GPA ($F(2,195)$= 9.71, p< .05) and it explained 14% of variation in GPA (R^2= .14).

5. Discussion

These is a growing number of studies concentrating on academic resilience, but to our knowledge, research on preservice English teachers' academic resilience in relation to gender differences and their achievement is non-existent. Therefore, this study was carried out to fill this gap in the related line of literature and contribute to the existing line of literature on gender differences in academic resilience as well as those on the relationship between academic resilience and achievement.

The results showed that participants engaged mostly with reflecting and adaptive help seeking, followed by perseverance and negative affect and emotional response in terms of academically resilient behaviors. This denotes that when faced with academic challenges, participants mainly preferred to monitor their academic endeavors, pondered on their strengths and weaknesses, changed their way of study, requested help and support, and implemented rewards and punishments (Cassidy, 2016). This comes to no surprise as reflection and adaptive help seeking behaviors are facilitative in that they can enable students to make meaning of their

educational experiences, foster continuity of learning and individual development (Rodgers, 2002) as well as fostering positive emotions (Ryan, Patrick, & Shim, 2005; Shim, Rubenstein, & Drapeau, 2016), increased academic engagement (Shim, et al., 2016), and enhanced understanding of course content (Karabenick & Knapp, 1991).

The results also showed no gender differences with respect to any dimension of academic resilience. Whereas this result is consistent with some previous studies (Baltacı & Karataş, 2015; Cassidy, 2015, 2016; Finn & Rock, 1997; Özcan, 2005; Rao & Krishnamurthy, 2018), there are other studies that contradict our finding (Allan, McKenna, & Dominey, 2014; Chisholm-Burns, Spivey, Sherwin, Williams, & Phelps, 2019; Çelik, 2013; Erdogan, Ozdogan, & Erdogan, 2015; Martin & Marsh, 2006, 2008; Mbindyo, 2011; McLafferty, Mallet, & McCauley 2012; Mwangi et al.,2018; Mwangi & Ireri, 2017; Sarwar et al., 2010; Sun & Stewart, 2007; Ulker Tumlu, 2013; Wasonga, 2002; Yavuz & Kutlu, 2016; Yokuş, 2015). The inconsistent results regard gender differences in academic resilience can be attributed to both the variations in the data collection tools used in different studies and the diverse samples used in these studies. Moreover, the insensitivity of current measures of resilience as argued by Hirani, Lasiuk, and Hegadoren (2016) might yet be another cause behind these mixed results.

Moreover, with respect to the relationship between resilience dimensions and GPA, negative affect and emotional response, contradictorily to the study of Toprak Çelen, (2020), had an insignificant negative relationship with GPA denoting that factors like anxiety, catastrophizing, avoiding negative emotional responses, optimism, and hopelessness were not instrumental in predicting GPA. This result may be attributed to Cumulative Grade Point Average (CGPA) being the main measure in determining academic credit restrictions and GPA being taken into account only in academic progression from the fourth semester to the fifth (Official Gazette of the Republic of Turkey, 2017); resulting in the neutralization of the weak negative relationship between this dimension and GPA.

In addition, the perseverance dimension was found to have a positive relationship with GPA. Perseverance as an individual characteristic has been previously determined as a key determinant of middle school and undergraduate achievement (Park & Peterson, 2009). Besides, the result obtained in this respect is also in line with studies carried out in the field of education by Strayhorn (2014), Kutlu, Kula-Kartal, and Şimşek (2017). However, it contradicts the significant negative relationship determined by Toprak Çelen (2020). The positive relationships determined support the idea that perseverance is facilitative when students try to improve their skill or when faced with difficulties (Kutlu, Kula-Kartal, & Şimşek, 2017). As the participants in this study were putting in effort to improve their foreign language and teaching skills and were faced with academic challenges relevant to all undergraduate students this result seems reasonable.

Lastly, the reflecting and adaptive help seeking dimension was determined to be a correlate and sole determinant of student success as measured by GPA. This result in line with Toprak Çelen (2020) who found a similar relationship between the variables. The result comes to no surprise as this dimension involves ruminating on strengths and weaknesses, emending ways of study, seeking assistance, reviewing effort and success, and implementing rewards and punishments. In other words, it involves initiative taking on part of the students to evaluate their academic situation and seek learning support both of which were found to be associated with improved academic achievement (Lew & Schmidt, 2011, Schenke, Lam, Conley, & Karabenick, 2015).

7. Conclusion

The results of the study demonstrated that reflecting and adaptive help seeking was the dominant type of academic resilience behavior undertaken by preservice English teachers followed by perseverance, and negative affect and emotional response. In this respect programs can be designed to train students to get them acquainted with the concept of resilience, develop their resilience skills, and apply these when and where necessary. With respect to gender differences in academic resilience dimensions, insignificant results were obtained. Therefore, it might be practically sound not to exclude any gender category when carrying out practices to foster resilience in students. Moreover, correlational analysis showed that negative affect and emotional response was a negative but insignificant correlate of GPA. Even though the result in this respect was insignificant it can be sound not to overlook the effect negative affect and emotions can cast on student success. On the other hand, perseverance was positively linked with GPA. This points to the importance of motivating students and making them believe in their own strengths and the value of professional academic help when facing difficulties. The study also determined reflecting and adaptive help seeking as a significant correlate of GPA as well as its only significant determinant. This results pints out to the importance of self-reflection, flexibility, help-seeking, self-monitoring, rewarding and punishing oneself. In this respect students can be trained in self-reflection, self-monitoring, and learning strategies, informed about academic help opportunities available in their institution, encouraged to visit these offices when faced with academic hardship.

Furthermore, it should be kept in mind that this study was utilized with a limited sample size and with a specific group of students composed of teacher trainees of the English language. Therefore, further studies can and should be conducted with similar and diverse groups of students at different levels of education. Additionally, longitudinal research on academic resilience can also unearth valuable insights. It should also be noted that this study was based on quantitative data. Future qualitative studies may be conducted to have a better understanding of academic resilience. First and last, academic resilience is an important concept in education irrespective of the educational level, gender, or age of the students and should be researched extensively to expand our understanding of the concept and to find ways to utilize it as a trainable personal characteristic to promote positive learning outcomes.

8. Conflict of Interest

The author declares that there is no conflict of interest.

9. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

10. Acknowledgements

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Acknowledgments

EDUCATIONAL RESULTS OF AN EXILE: THE AHISKA TURKS

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EDUCATIONAL RESULTS OF AN EXILE: THE AHISKA TURKS [1]

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Abstract

The restrictions imposed by a state on the way of life of a certain ethnic group, and the education policy implemented on that group, may prevent the use of the right to education, which is one of the fundamental human rights. This study focuses on the educational consequences of the exiling from their homeland of the Ahiska Turks (or Meskhetian Turks) who lived in the Ahiska (Samtskhe) region of Georgia at the time of the Soviet Union, in the year 1944. This descriptive study adopted the case study design based on qualitative research techniques. The data were gathered through a semi-structured interview form given to four participants selected via criterion sampling method from different generations who were either sent into exile, were born and grew up in the place of exile, or were born after the break-up of the USSR and were attempting to settle in another country. The data were analysed using the descriptive data analysis techniques, and the results revealed that the exiled Ahiska Turks suffered losses in terms of education due to their exile and its consequences. These losses were categorized in four groups, namely, losses stemming from leaving the community devoid of intellectuals, losses due to literacy becoming more difficult, losses originating from being forced into agricultural labour, and losses due to exposure to ethnic discrimination.

Keywords: Ahiska Turks, exile, educational loss, discrimination, educational inequality

1. Introduction

1.1. A Short History of the Ahiska Turks

The known history of the Ahiska Turks begins with the record of the name "Bun-Turks" mentioned in old Georgian chronicles (GNAS, 2014: 20-21; Gippert, 2015: 31; Tellioğlu, 2020: 27). It is claimed that the name "Bun-Turk" means "indigenous, autochthonous / aboriginal Turk" (Gippert, 2015; Koç, 2016). The Ahiska Turks, and the Northeast Anatolian Turks who share the same ethnographic characteristics as them, are given the name "Native Turk" by the other ethnic groups that they live with (Çınar, 2020: 7). The Bun-Turks, as a people of Turkic origin who inhabited the area along the Kura River, were one of the ancient inhabitants of the Caucasus (Kırzıoğlu, 1992: 81; Koç, 2016). In addition to the Bun-Turks, at the time of the Georgian King David IV (1089-1125), a large population of the Christian Kipchaks who inhabited the Don-Kuban area came by invitation and settled in Georgia (Kurat, 2019: 83-84; Tellioğlu, 2019: 56, 93). Later, the region, which passed into the possession of the Ilkhanate, was reshaped in the hands of the Ruler Abaqa Khan (1265-1282). Abaqa Khan ruled his country with a type of autonomous state model known as the Atabegate. In 1267, an atabegate (autonomous administrative area) was created under the name of the Samtskhe Atabegate (in Georgian სამცხე-საათაბაგო, or Samtskhe Saatabago),

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[1] This article is the expanded version of a text presented as a verbal statement at the meeting named *The 2nd International Turkish Communities Knowledge Fest: the Ahiska Turks*, organised jointly by Uludağ University and the Turkish Hearths Bursa Branch on 11th March 2019 in Bursa.

with its centre at the Castle of Cak in Posof [2] (Kırzıoğlu, 1992: 150). Following the collapse of the Ilkhanids, the Samtskhe Atabegate maintained its existence under the protection of the Ak Koyunlu, Kara Koyunlu and Safavid Dynasties. In 1578, the region became part of the Ottoman Empire following the Battle of Childir that was fought between the Ottoman State and Safavid Dynasty. Population movements occurred during these periods, and Oghuz-Turkmen communities also settled in the region and took part in the ethnogenesis. The Ottoman State did not change the dynasty that ruled the Samtskhe Atabegate, but the dynasty changed its religion and became Muslim. Akhaltsikhe (Ahiska) became the centre of the province. This region was known as the Eyalet of Childir, and sometimes also as the Pashalik of Akhalzik, during the period of the Ottoman Empire.

Following the Russo-Turkish War of 1828-29, the Eyalet of Childir was broken up. Ahiska (Akhaltsikhe), which was the centre of the Eyalet, and the surrounding area was ceded by the Treaty of Adrianople (1829) to Russia as a war reparation, while a large part of the province remained in the Ottoman Empire. In this way, Ahiska was separated from the Eyalet of Childir. During the Russo-Turkish Wars fought in the 19th century, Russia advanced as far as Erzurum and the whole of the Eyalet of Childir (the Samtskhe Atabegate) was annexed to Russia.

Due to Russia's Caucasus policies in the 19th and 20th centuries, this community was seriously affected and suffered from tragic breaches of human rights (Baddeley, 1908; Memmedova, 2015; Toksoy, 2015; Üren, 2016). As a result of this oppression, a number of Turks, especially from around Akhaltsikhe (Ahiska) and Akhalkalaki migrated to the Ottoman Empire. However, a large group continued to live in Akhaltsikhe and the surrounding villages.

When Tsarist Russia collapsed due to the Bolshevik October Revolution, Russia withdrew from the region. At that time, the Ottoman Empire also collapsed, and the Turkish Republic that was established in its place signed the Treaties of Moscow and Kars with the Soviet Union in 1921 (Buntürk, 2007; Çerniçenkina, 2014). According to these treaties, as in the Treaty of Adrianople, Ahiska remained separated as part of the Georgian SSR of the Soviet Union. The Ahiska Turks that are the subject of this research are the community that remained in the neighbouring country of Georgia, probably because of the inappropriate drawing of the boundary.

There are various views as to the reason for the exile. According to one view, the Stalinist regime regarded ethnic cleansing as a part of general security and exiled the Ahiska Turks from Georgia for this reason (Pohl, 1999, 137). Due to the importance of the geostrategic and geocultural conditions of Ahiska, the Stalinist regime pursued a policy of purging the border with Turkey of Turks by completely exiling the Ahiska Turks from the region (Aydıngün, 2002; Buntürk, 2007).

It is obvious that the exile of the Ahiska Turks amounted to ethnic cleansing. Following the hastily conducted exile, the victims of the exile objected to the exile and wrote petitions to return to their homes from the areas where they were sent. The Interior Ministries of the USSR and Georgia exchanged correspondence with each other concerning these petitions. Some of these correspondences were published by Bugai (1994: 57-58). In the correspondence of the Georgian Ministry of the Interior numbered 4/0-2507 and dated 24th September 1945, which is one of the documents published by Bugai, the objections were

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[2] Posof is a district of Ardahan in Turkey. According to the Google map measurement, its distance from the city centre of Akhaltsikhe (now in Georgia) is 25 km as the crow flies. The centre of the Atabegate founded by the Ilkhanids was the castle of Cak in Posof. The centre was later moved to the city of Akhaltsikhe (Ahiska).

evaluated, and while some petitioners who wished to return to their homes were rejected on the grounds that "it was not a mistake to exile them since they were Turks", it was reported that the objections of some Laz people, who had been sent away as they were assumed to be Turks, were accepted and that they should be able to regain Georgian citizenship. The ethnic names of those who were to be exiled were already specified in the decree of exile. Finally, on 14th November 1944, the Ahiska Turks were collectively exiled by force to Kazakhstan, Kyrgyzstan and Uzbekistan. In the exile, the smaller populations of Hamshenis and Kurds who lived in the region and kept company with the Turks were also sent into exile. This exile led to many breaches of human rights. This article focuses on the educational losses resulting from the educational problems faced by the Ahiska Turks as a people in exile.

1.2. Who are the Ahiska Turks?

The Ahiska Turks are a Turkish-speaking, Sunni Muslim people who lived in the Ahiska region, which was for centuries within the Ottoman Empire and is now in Southwest Georgia on the border with Turkey. In the literature, they are a community that is generally confused with the Muslim Adjarian Georgians. The Ahiska Turks are a small section of a divided community. Another, larger section, which displays the same ethnographic features as this community, lives in the provinces of Ardahan, Artvin, Kars and Erzurum, in an area known historically as the Atabegate (Atabek Yurdu), which is still located in the Northeast of Turkey (Kırzıoğlu, 1992: 150; Çınar, 2020).

This community became divided as a result of drawing the boundary between Turkey and the Soviet Union (Georgia) inappropriately. The Ahiska Turks were subjected to many infringements of human rights in Georgia for ethnic reasons. Yemelianova (2015: 79) sums up these violations as follows: *"Prior to deportation, between 1928 and 1937, Meskhetian Turks were subjected to forcible 'Georgianization', involving the official change of their nationality and surnames. After their deportation they were subjected to a discriminatory settlement regime, which denied them basic citizenship rights until 1956".*

Although there has been controversy as to the ethnic roots of the Ahiska Turks, this debate appears to be over. In the decree of exile, they are a group recorded as "Turks", Turkish-speaking and declaring their own identity to be Turkish (Wimbush & Wixman, 1975: 338; Aydıngün & Aydıngün, 2015: 35; Poyraz & Güler, 2019). Then again, the history of the ethnogenesis of the region and community is a subject for other branches of science. In the scientific literature, they are referred to by the name of the geographical area as Ahiska Turks or Meskhetian Turks.

The Ahiska Turks were exiled to Kazakhstan, Kyrgyzstan and Uzbekistan on 14th November 1944 by a decree signed by Josef Stalin, the Premier of the Soviet Union (Pohl, 1999: 132; Pentikäinen & Trier, 2004: 9-11). The journey into exile was made under terrible conditions and was dispersed into countries suffering the ravages of the Second World War, and during this process, many people died of cold, hunger and disease. Nowadays, the Ahiska Turks live scattered in Kazakhstan, Kyrgyzstan, Uzbekistan, Russia, the USA, Turkey, Azerbaijan, Ukraine, Northern Cyprus and, albeit few in number, in Georgia.

Following their deportation, the Ahiska Turks always wished to return to their homelands, but the USSR administration refused to allow this. Nevertheless, while the USSR was still in existence, the Supreme Council of the Russian Federation issued the "Rehabilitation of Exiled Peoples" law on 26th April 1991, and in this law, exiled peoples were recognised as "peoples exposed to genocide and subjected to forced emigration as a result of political vilification" (clause 2) and it was stated that they would be able to return to their homelands

(Zakon, 2020). Due to the disintegration of the USSR within a short time, however, this legal arrangement could not be implemented.

1.3. Exile and the Ahiska Turks

Exile is imposed on a cultural minority for political and ethnic reasons, and its consequences sometimes last for centuries. The exiling of a community is an event which leads to negative demographic, economic, sociological, cultural, political and educational outcomes. Principal among the consequences that it causes are problems such as death, ostracisation, poverty, lack of education and disorder. People in an exiled society are exposed to discrimination and exclusion in the places that they move to. As a result of this, they continually live as foreigners in the society where they are located.

In the Soviet Union in the 1940s and 1950s, many communities were forced to migrate en masse from their ancestral lands to other areas. The exiles were particularly intensified in the year 1944. Among the exiled were ethnic groups such as Volga Germans, Crimean Tatars, Chechens, Ingush, Karachays, Balkars, Kalmyks, Ahiska Turks, Lithuanians and Latvians (Özcan, 2007: 202-203).

Alam (2019: 274-280) examines the losses suffered by the Ahiska Turks in exile by separating them into the following items: landlessness, joblessness, homelessness, marginalisation, food insecurity, increased morbidity, loss of access to common property and services, and community disarticulation. According to Alam, the Ahiska Turks experienced great losses in all these respects.

A few years after exile, the Ahiska Turks were in a deplorable condition. In the region in which they settled, hundreds of thousands of people died due to famine, drought, and diseases like malaria, dysentery and typhoid resulting from inadequate health conditions and difference in climate (Özcan, 2007: 202).

The Ahiska Turks were unexpectedly and traumatically sent to countries that had very different cultures, climates and geographical features from their own (Aydıngün, 1999). The Ahiska Turks who were exiled had to deal with great problems ranging from social, economic and cultural problems, and incompatibility with the climate, right up to being treated as "enemies within" due to being Turks within the scope of "enemy law" under martial law (Keskin & Gürsoy, 2017; Karcı, 2018). Among the principal problems were also educational problems. There are many studies related to the Ahiska Turks in a number of fields, such as history, culture, folklore and religion. However, there are virtually no studies related to their education lives under their conditions in exile.

1.4. Education in Ahiska Before the Exile

Education is an activity that develops humanity. Educational activity, which begins in the family and continues at school and in the social environment, is the task of developing the skills of the individual and transferring cultural heritage to him or her. People who do not benefit from education cannot develop qualities specific to humans or utilise the innate capacity that they possess. In this context, after the right to life, education is one of the most important human rights.

Ahiska (Akhaltsikhe) was the centre of the Eyalet of Childir or Pashalik of Akhalzik at the time of the Ottoman Empire. Ahiska had a high madrasah and was a place that educated its own intellectuals and artists. It provided many elements for the high bureaucracy of the Ottoman State. In Ottoman times, the Ahiska madrasahs were renowned in that region. Many important people were educated in these madrasahs, rising to important positions both in the sciences and in state bureaucracy (Zeyrek, 2006: 34; Balcı & Temiz, 2015).

The Ahiska Turks lived in Ahiska, which was an important centre of education, science and culture in the Atabegate. Ahiska maintained its characteristic as a centre of science and culture despite the continuing oppression and policy of forced migration following the 1828 Russian invasion. It had a strong tradition of oral culture and its folk literature was also powerful (Memmedli, 2018).

In the year 1905, there were 106 masjid schools (*sıbyan mektebi*) in the Turkish villages in the Ahiska region (Gocayeva-Memmedli, 2009). These were schools that provided religious elementary education. The first school providing contemporary scientific education was a Jadidist school that opened in 1881 in Azgur. In later years, one of the teachers at the school was the intellectual democrat Ömer Faik Numanzade. Numanzade had received his education at the Darüşşafaka High School, which was one of the few schools in Istanbul that conducted scientific education. Even that school alone enlightened the Turks in the village of Azgur (Askuri), affiliated to Ahiska, to a significant extent, and brought them to the fore in society.

In the Ahiska region, schools offering scientific education were opened in Azgur and Ökem in 1881, in Hırtız in 1885, in Adıgün in 1895, and in Sinis, Varhan and Oşora in 1897 (Goca Memmedli, 2018: 219). In these schools, which were opened in Turkish villages with the permission of Tsarist Russia, Turkish lessons were also given (Goca Memmedli, 2018: 219). Following the Bolshevik Revolution, schools were opened in all the Turkish villages of Ahiska, and Turkish became the language of learning.

According to the records of the Georgian National Archive, 168 schools providing education in Turkish were opened in the Ahiska-Ahılkelek area in 1936, and a total of 14,256 students were registered at these schools. This means that almost all children of school age attended school (Goca Memmedli, 2018: 219).

Table 1. *Number of schools and students in Ahiska (1936)*

Districts	Number of Schools	Number of Students
Adıgün	61	5,821
Ahiska	55	4,032
Aspinza	42	3,398
Ahılkelek	9	801
Bogdanovka	1	204
Total	168	14,256

Source: Georgian National Archive 300/8/515, pp. 55-72. (Cited in Goca Memmedli, 2018: 219)

The success of the Soviet Union in enabling equality of opportunity in education and providing scientific education was applauded. Commendable activities by the Soviet Union such as freeing the people from ignorance, implementing compulsory education for all and making the 44 million people within its borders literate are included in the history of global civilisation (Alimbekov, 2019: 283). Books were also written to enable education in the mother tongue, but the Ahiska Turks were deprived of this right within a short time. The Ahiska Turks were unable to benefit from the success of the Soviet education system to the same extent as other communities. Indeed, Zemskov (2005: 177-179) wrote that 62% of the exiled Ahiska Turks did not know how to read or write in any language (cited by Pohl, 2014: 18). The Ahiska Turks were caught between the local Georgian administrators, who were determined to "Georgianize" them, and the Soviet Union's "Nationalities Policy" (Yemelianova, 2015: 79; Üren, 2016: 126; Şirin Öner, 2019).

The Ahiska produced their own intellectuals from the second half of the 19th century onwards under the influence of the Jadidist movement. An intellectual is a person who reads, knows and thinks, and produces knowledge, art and philosophy about himself, his nation and humanity. Intellectuals are people who elevate societies and humanity, who open new ways and who occupy the position of the brains of society. Undoubtedly, societies and humanity have need of such people. Societies without intellectuals are like abandoned children. The Ahiska Turks also endeavoured to educate intellectuals. However, following the 1917 October Revolution, the Ahiska intelligentsia were eradicated by the Soviet regime with the excuse that they were "land barons", "anti-regime" or "Panturkist" (Pohl, 2006; Aydıngün & Aydıngün, 2015: 40; Keskin & Gürsoy, 2017: 20). Since the Ahiska people were scattered due to exile by Soviet Russia and kept under martial law in the places they moved to, the raising of new intellectuals was made difficult.

No studies about the educational status of the Ahiska Turks after their exile can be found. The main aim of this research is to reveal the educational problems that resulted from the exile of the Ahiska Turks, who were deported by the USSR and Georgia to Kazakhstan, Kyrgyzstan and Uzbekistan in 1944.

With this aim, in the study, the consequences for the educational and cultural life of the Ahiska Turks that resulted from the mass exile in 1944, at the hands of the Soviet Union, of around 100 thousand Ahiska Turks who lived near the borders of Georgia and Turkey, constitute the main aim of this study. In this context, the following sub-aims are examined:

1. What were the educational problems caused by the absence of intellectuals?

2. What were the educational problems related to the complication of literacy?

3. What were the educational problems caused by the coercion of the Ahiska Turks into agricultural labour?

4. What were the educational problems created by ethnic discrimination?

2. Method

2.1. Research Design

This study was designed according to qualitative research techniques. In qualitative research, an actual situation with equivalents in real life is discussed (Creswell, 2013, 2016). Since this study was made with four people from different generations who were exiled from Ahiska and experienced the exile and the subsequent period, together with findings obtained by a review of the literature in databases via the library and internet, the aim was to describe an actual situation in this respect. Therefore, a descriptive case study design was chosen for the research. Case studies are discussed holistically by dealing with an event that is the subject of the study in a certain environment. Therefore, the four people exiled from Ahiska represent the case as people who experienced the event.

Also in the research, an attempt was made to describe the actual situation by means of document scanning. In documentary analysis, which is one of the qualitative research methods, the relevant documents may be documents in a written and electronic environment. The documents in this study are documents that can be used to be shown as sources without the need to obtain the permission of the authors. The documents are used as part of the method by considering them as a raw material (Bowen, 2009).

When considered in this framework, studies discussing the migrations of the Ahiska Turks have been included in the examination. Document analysis is made by means of examination via existing records and this is known as the document scanning method. In the scannings,

the experiences of people who lived through the situation of the forced migrations of the Ahiska Turks were examined. Documents regarded as best reflecting the situation experienced by the Ahiska Turks were considered in the screenings (Madge, 1965; Yıldırım & Şimşek, 2011). In this qualitative study, data obtained through interviews combined with data collected by examination and evaluation of the documents were examined under four main thematic headings. The documents are limited to publications included in the references and related to the forced migrations of the Ahiska Turks.

2.2. Study Group

In the research, criterion sampling, one of the purposive sampling methods, was utilised. Criterion sampling is based on the researcher's formation of certain criteria and making choices according to these (Yıldırım & Şimşek, 2013). In this study, the criteria were the selection of four people who had been forced to migrate at certain times and who belonged to different age groups so as to represent different generations.

Table 2. *Demographic characteristics of Ahiska Turks in the study group*

	Participant 1 Binali	Participant 2 Anahanım	Participant 3 Narhanım	Participant 4 Serinaz
Age	87	70	47	9
Places lived in	Uzbekistan and Russian Federation / Bursa-Turkey	Taraz-Kazakhstan / Bursa-Turkey	Merki-Kazakhstan / Bursa-Turkey	Azerbaijan and Georgia / Bursa-Turkey
Gender	Male	Female	Female	Female (Child)
Education level	Bachelor's Degree	Associate Degree	University-Doctorate	Primary School
Occupation	Retired Teacher / Journalist	Retired Accountant	Academician	Student
Nationality	Russian Federation	Kazakhstan	Turkish Republic	Georgia

Participants and their characteristics: The source people from whom the data were gathered are four people from different generations who were either sent into exile, were born and grew up in the place of exile, or were born after the break-up of the USSR and were attempting to settle in Turkey. The majority of their lives were spent in Uzbekistan and Russia, Kazakhstan, Turkey, and Georgia, respectively. One of the participants is a man, two are women, and one is a girl. The original names of the participants have been changed.

Binali was born in 1932 in the village of F. in Ahiska, and is 87 years old. He received education in Turkish until 4th grade in Georgia. In 5th grade, he moved on to education in Georgian, but after having lessons for a few months, on 14th November 1944, he was deported to Uzbekistan together with his family. In Uzbekistan, they were settled in a village 20 km away from the city. Until 1956, he was unable to leave his village because of the martial law imposed on the Ahiska Turks. Therefore, he was unable to attend the high school in the district. After martial law for the Ahiska was lifted, he finished high school externally, and with the personal support of Rashidov, the Uzbekistan head of state, he registered at and graduated from a university providing education in Russian. He knows Turkish, Russian and

Georgian, and also speaks Uzbek and Balkar Turkish. He worked in teaching and journalism. He is retired and has lived in Turkey for five years.

Anahanım is 70 years old and retired. Her family was exiled from Ahiska to Kazakhstan while her father was a soldier in the Second World War. She herself was born after the exile in a village in Kazakhstan. She lost her mother when she was 12 years old. As she was a girl, she was taken out of school by her father to look after her younger siblings and do the housework. Later, she finished school externally. She has three children. She moved to Turkey a year ago, and has not yet obtained Turkish citizenship.

Narhanım is an Ahiska Turk working in Turkey as an academician. Her grandparents were exiled from Ahiska, and she is the child of a family whose parents were born in Kazakhstan. During the break-up of the Soviet Union, she graduated with honours from high school in Kazakhstan. She completed her bachelor's and postgraduate education in Turkey. After obtaining Turkish citizenship, she was appointed as an academician. She is 47 years old and has lived in Turkey for 27 years as a Turkish citizen.

Serinaz is 9 years old. Serinaz's great-grandfather was exiled from Ahiska to Uzbekistan. Her grandfather was born in Uzbekistan. When he grew up, the family moved to Azerbaijan since it is close to Ahiska, and moved to Georgia from there. Serinaz was born in Georgia. The family came to Turkey 4 years ago and are not yet Turkish citizens. Serinaz lives with her mother, grandmother and 7-year-old brother. Her mother works in Bursa as a clandestine worker. Since Serinaz does not have a passport, she was only able to start primary school two years later than her peers with the aid of a benefactor.

Ethical rules were taken into consideration in this research. While the participants were being included in the interviews, it was decided to identify them with assumed names. Therefore, the names Binali, Anahanım, Narhanım and Serinaz were used. Interview was taken with Serinaz under the supervision of her mother. The necessary information acquired from her mother. Interviews were recorded with sound.

2.3. Data Collection Tool and Collection of Data

In the research, a semi-structured interview form developed by the researcher was used. The questions included in the form are given below:

1. What were the educational problems caused by the absence of intellectuals?

a- What was the level of the Ahiska Turks' ability to read the state's official directives in Russian during the exile and afterwards? Can you explain?

2. What were the educational problems related to the complication of literacy?

a- How many times was the Ahiska Turks' alphabet changed during the period 1920-1945?

b- Did the Ahiska Turks receive the education in the mother tongue that was recognised for all communities in the Soviet constitution? How?

3. What do you think about the coercion of the Ahiska Turks into agricultural labour? What were the educational problems caused by this?

4. What were the educational problems created by ethnic discrimination?

a- Are there examples of any effect, alienation, or deprivation of rights granted to other communities due to being Turkish?

b- What was the level of women's interest in school education other than compulsory education?

During the question formation stage, the researcher created the questions by obtaining expert views of people who worked in this field. The semi-structured questionnaire form was given its final form in line with the views of a professor in the field of education sciences and an associate professor who was a historical researcher. The interviews were conducted by making appointments and going to the participants' homes. In order to create a sincere atmosphere, the researcher went to the interviews with his wife, in accordance with the customs of the Ahiska, and the data were thus gathered by creating a friendly atmosphere. The interviews were conducted in February 2019 and lasted between 60 and 110 minutes. The interviews were made in Turkish and sound recordings were made of most of the interviews.

2.4. Data Analysis

The descriptive analysis method was utilised for the analysis of the data. While the descriptive analysis was being made, the participants' views under the themes previously determined by the researcher at the first stage of the research, and views included in the literature were evaluated together. The results of the analyses are explained and interpreted under the four themes determined while preparing the interview questions, containing the headings: *i.* Educational problems caused by the absence of intellectuals, *ii.* Educational problems related to the complication of literacy, *iii.* Educational problems caused by the coercion of the Ahiska Turks into agricultural labour, and *iv.* Educational problems created by ethnic discrimination. By underlining interview scripts read more than once with a different colour in such a way as to include them under each of the four themes, the aim was to prevent loss of data under different themes. The data obtained from the interview scripts were combined and interpreted by assigning them to similar themes following examination of documents included in the literature.

2.5. Validity and Reliability

Lengthy interviews were conducted with the people interviewed in the research, and the focus was on obtaining detailed information. Attention was given to a sustained interaction during the data collection process. In the analysis and presentation of the data as findings, a connection with the literature was established and interpreted. During the research process, the views of experts were obtained for creating the data collection tool, and a test application was conducted for lucidity of the questions. The interviews were made by establishing conditions in which they could be carried out uninterruptedly and in a quiet environment. The interviews were taken up for analysis after requesting the consent of the interviewees and obtaining the necessary confirmations. During the research, in order to ensure reliability, the interviews were conducted by more than one (two) researchers to prevent researchers' bias from being reflected in the research. To increase transferability of the research, detailed descriptions were made, and direct quotations were frequently included. By describing the participants' characteristics in detail in the research, an attempt was made to increase the reliability of the study. Moreover, as another proof of reliability in the study, all interviews and documents were archived.

3. Findings

The exile had a negative impact on the Ahiska Turks' educational and cultural lives. According to findings obtained from the views of the participants and the review of the literature, it was revealed that these problems were grouped under four themes. These themes were determined as *absence of intellectuals*, *complication of literacy*, *coercion into agricultural labour*, and *ethnic discrimination*.

3.1. Educational Problems Caused by Absence of Intellectuals

The greatest wealth of a society is its educated, qualified population. The best qualified of this qualified population are its intellectuals. Societies that possess intellectuals overcome their other deficiencies. For those which lack intellectuals, however, no matter how many riches gush forth from every place in the land or how great a cultural stock is accumulated from their ancestors, they cannot put these to good use. Societies that wish to maintain civilisation in the future will first raise intellectuals and see the way ahead by their light. Based on this, the eradication of another society's intelligentsia at the hands of a state or society can be evaluated as a great evil.

In the literature, the findings and interpretations in works examining the consequences of depriving the Ahiska Turks of their intellectuals following their forced migration are as follows:

The Ahiska Turks were subjected to cultural and economic pressures aimed at changing the demographic makeup after the area passed into the hands of Russia in 1828 (Yemelianova, 2015; Kurt, 2019). Instead of enduring these pressures, those with a high socio-economic level moved over to the Ottoman State. This was a kind of brain drain. Due to the collapse of tsarism and its replacement by socialism, and also to the social conflicts and chaotic situation experienced at that time, this brain drain deprived the Ahiska of the intellectuals who could lead them, defend their socio-cultural rights and guide the community. The period of the "Red Terror" implemented between 1918-1922 annihilated the opinion leaders and also those with a potential for this (Güngör, 2018). The newly educated ones were killed or sent to labour camps in Siberia without seeing the need even to judge them, with accusations of being anti-regime or Panturkist (Şirin Öner, 2019: 66). B. Hınızoğlu, whose views were consulted in a study, mentions the period between 1930-1938, which was a new period of oppression and which was named "*repressia*" (repression), as follows:

"Those who were literate were sent under a pretext from Ahiska to Siberia. Nothing was ever heard of them again." (Aydemir, 2018: 216).

Among the reminiscences of Veyseloğlu, who was given the title of war hero several times during the Second World War, and who returned with medals, he wrote that "*the oppression continued from 1921 until 1937, and especially intellectuals and religious people were arrested and taken away.*" (Aliyeva Çınar, 2016). Even socialists and those joining socialist organisations could not avoid being killed (Pohl, 2006; Bayraktar, 2013). Indeed, the Ahiska intellectual, journalist and politician, Ö. F. Numanzade, was also one of those murdered in 1937 (Şirin Öner, 2019: 66).

In the 1930s, Stalin created a regime that could be characterised as brutal. On the grounds of making a cultural revolution by annihilating the bourgeoisie and feudalism, thereby establishing the socialist order that he idealised in his mind, he set up his own dictatorship by implementing the "Red Terror". During this dictatorship, all peoples and sections of society in Russia suffered terrible tragedies. Those of the Turkish communities were the most severe. Not only did they fall victim like the other communities, but also, their intellectuals were murdered due to being branded as "bourgeois, land barons, racist, or Panturkist" (Keskin & Gürsoy, 2017: 20). These were generally killed without trial or by being tried in kangaroo courts. Following the death of Stalin, those murdered during the *repressia* period were retried and generally found not guilty.

Among those subjected to cruelty and oppression were Russians and Russian Jews. The Russians and especially the Jews wrote about their experiences. In the academic literature,

there exists a vast amount of literature created by Russians, especially by Tsarist supporters and Jews who were able to escape. In fact, even Jews on the outside who learned about those inside branded Stalin as antisemitic (Smith, 2006). The Turks, however, were unable to leave or to contact their relatives on the outside, nor were they able to write about their experiences. On the other hand, some historians criticised the other group of historians, whom they called revisionist, for erasing what was done by the Stalinist regime. In their opinion, the revisionist historians had become "cleansers of ethnic cleansing" by reporting the ethnic cleansing carried out by the Stalinist regime as "those sent into exile were enemies of the state" (Martin, 1998; Chang, 2019). Due to these "cleansers", the true facts remained in the dark for many long years.

The massacre of the intelligentsia reached its peak in 1938. In fact, in that year, all areas of the Soviet Union were like hell. During this period, known as the great terror or *repressia*, millions of people were annihilated due to heavy repression and execution without trial. Although all communities suffered from this annihilation, the greatest tragedy was experienced by the Ahiska Turks. Hardly any literate persons, let alone intellectuals, who could write letters remained.

Another aspect of the loss of intellectuals or literate people among the Ahiska Turks emerged with the recruitment of Ahiska men into the army for the first time. Males aged between 17-55 were conscripted to defend Russia in the Second World War. Considering that literate people were generally male and that about 50 thousand of these were drafted into the army[3], the situation arose that neither men nor literate people remained in Ahiska. This was the situation at the time of exile. Gazigil (2016: 33), who was a lawyer and one of the Ahiska exiles, wrote in his memoirs that families whose men had been recruited into the army suffered greater hardships. Paşaoğlu (2012: 42), who was 5 years old at the time of exile, wrote the following in the book in which he told his life story:

> *"When my father was conscripted, my mother had kidney disease. My poor mother was left alone and unprotected in exile with three children. (...) Her situation gradually worsened. She died in 1945 aged 28. As for my father, he never returned from the army."*

Since the war was going on, the soldiers were unable to return to Ahiska, while those who survived and were able to return could not find their families in Ahiska because they had been exiled. In short, when the Ahiska went into exile, hardly any educated or literate persons remained. Indeed, Binali, who was one of those exiled as a child and student, stated the following during his interview:

> *"No one was left who could guide the children, the youth, or even the women. The men had been conscripted and most of them did not return. Very few of the women could read. Moreover, we were taken to a foreign land. Everything was strange to us, and we only tried to survive."*

After expressing her view that in the Soviet Union, the decision was taken to eliminate the representatives of feudal culture and the opinion leaders in society in order to facilitate the establishment of socialism, Narhanım also emphasised the impact of the removal of the intellectuals:

> *"The new regime was both a Russian chauvinist and a rigid modernist one. The rapid achievement of their aims depended on their elimination of our literate*

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[3] This is the number quoted among the Ahiskas, but no reliable figure or source could be accessed on this subject.

people or our opinion leaders. Many Ahiska intellectuals, notably the journalist and thinker Ö. Faik Numanzade, were killed. When Numanzade was murdered in 1937, he was not anti-revolutionary, he was a social democrat. These events spread terror in our community. When we saw what was happening to educated people, our interest in school and education decreased.”

Narhanım's view that the Stalinist regime was racist in character supports the revelation by Martin (1998: 860) and Pohl (1999) that characterises the period of 1937-49 in the Soviet system as the years of ethnic cleansing. The account given by Serinaz's mother also supports Narhanım's view. She stated that when she saw that those who had been educated at school were being killed, she stayed away from education at her family's own request:

“Those who were educated had already been sent to Siberia before 1937. None of them returned. Therefore, my grandfather did not allow his children to be educated. ‘They might be ignorant, but at least they'll stay alive’, he said.”

The massacre of intellectuals in the Soviet Union reached its peak in 1937 and 1938 (Yıldırım, 2018: 52). This view is supported by Anahanım's information. She expressed it like this:

“During the years between 1930-1938, the Soviet state condemned people to death without trial. These were generally educated people. While we were in Ahiska, we lost our affection for education. Moreover, when we also experienced exile, we no longer felt the need for education. During the Soviet period, no politicians, top executives or artists emerged from among the Ahiska.”

When the events of the period between 1930-1938 which aimed to establish the Soviet regime and bring about a mindset revolution are examined, the period is known as *repressia* (repression). There are numerous documents and publications related to this period (Güngör, 2018; Şirinov & Erşahin, 2018; Yıldırım, 2018: 53). The Ahiska Turks received more than their share of this repression. Narhanım draws attention to another consequence of the falling education level among the Ahiska Turks:

“Those who stayed away from school could not learn Russian sufficiently. The humiliation that resulted from the period of repression, when combined with lack of knowledge of Russian, reduced the Ahiska to the status of slaves who would do any kind of work that they were ordered to do. As a result of this, they could not raise their heads above working in the large agricultural collectives in Central Asia, and their children also generally showed a tendency to perpetuate that lifestyle.”

According to Narhanım, the desire of Ahiska youth in exile to receive higher education began to increase in the 1980s. It can be understood that education for the Ahiska Turks had by then ceased to be dangerous. During that period, the increasing number of television broadcasts must have shown that there were different occupations and lifestyles for young Ahiska Turks apart from agriculture and have steered them towards higher education. However, this does not mean that there was a mass demand for higher education among the youth. A large number of them continued to work in collectives.

The Ahiska Turks' opinion leaders and educated people, and those who knew Russian, which was the *lingua franca* in the country, had been killed prior to 1938 by the Stalinist regime. The remaining people who were literate and knew Russian (these were generally male) were recruited into the army up to the age of 55. Those who were exiled in 1944 were women, children and elderly people who were illiterate and did not speak a foreign language. Great losses were incurred in the war and at least half of those who joined the army did not

return. Consequently, no literate, multilingual people remained among the Ahiska Turks who were able to explain the directives of the regime or give guidance to the community, let alone intellectuals. It can be said that the elimination of educated people was one of the reasons why the Ahiska Turks became alienated from school and education.

3.2. Educational Problems Related to Complication of Literacy

This community experienced problems with reading and writing habits and skills when the alphabet was changed. Even those who were literate were suddenly forced to deal with reading and writing problems for a time since they were unable to use the new alphabet. Even during one generation, the Ahiska were exposed to several changes of alphabet and to the problems stemming from this.

In the literature, the findings and interpretations found in works that examine the consequences of the complication of literacy that followed the forced exile of the Ahiska Turks are as follows:

Until the year 1924, the Turkish alphabet with Arabic script was used in Ahiska. Between 1924-1939, they were taught in Azerbaijan Turkish with the Latin alphabet. They printed books and newspapers in Turkish. They published newspapers in Turkish with names like *Kızıl Rençber* (The Red Labourer) and *Adıgen Kolhozcusu* (The Adıgen Collectivist) in Adıgün, *Kommunist* (The Communist) and *Kızıl Bayrak* (The Red Flag) in Ahiska and *Bağban* (The Gardener) and *Sosyalizm Kendi* (Socialism Town) in Aspinza (Memmedli, 2012). Some Ahiska also learned the Cyrillic characters by attending Russian schools in order to receive a better education. Between 1939-1944, the alphabet in Azerbaijan was changed and Azerbaijan Turkish with Cyrillic characters was introduced. The Ahiska also attempted to learn this.

Binali had this to say about the change of alphabet:

> *"We saw four alphabets: Arabic, Latin, Georgian, and Cyrillic. I was a child, I learned them easily but our older people could not learn them. Women who were past school age could not learn them at all."*

While in Georgia, Binali, who was supposed to receive mother tongue education according to the Russian constitution, was educated in Azerbaijan Turkish for the first four grades, whereas in the fifth grade, education in the Turkish mother tongue was discontinued and he was taught in the Georgian language. Binali was educated in Uzbek Turkish in Uzbekistan. He says, *"I learned Uzbek straight away. My teacher said that I spoke better Uzbek than his Uzbek students, and showed me as an example to them.*

After stating that she lived in a village, Yıldız Bahriyeva, whose views were consulted for a study, said that in Ahiska, since all the men had been recruited into the army, the fields could not be sown and the people became very poor. She said, *"There was school, but the children did not have any clothes to wear for going to school; they were hungry, and they could not go to school."* (Aydemir, 2018: 117). Speaking in the same study, Kandef Mededova said, *"I attended the first grade of primary school in Ahiska and studied in my own language. After the exile, I was not able to study in my own language."* (Aydemir, 2018: 118).

Poverty increased further in the years following the exile. Saniya Halidova, one of those exiled to Uzbekistan, states that due to the bad living conditions in the first years after exile, school did not even enter their heads:

"Since people could not find food; they ate the fodder that the animals grazed on. On some days, scores of people died of hunger or because of the unknown plants that they ate." (Aydemir, 2018: 199).

During the Second World War, teachers in Ahiska were also conscripted into the army. In primary schools in the villages, high school graduates or students acted as teachers. In 1944, the Ahiska were sent into exile. When they went to places like Kazakhstan, Kyrgyzstan and Uzbekistan, they were obliged to begin education and reading completely in Russian with the Cyrillic alphabet. Both the alphabet and the language of education were changed. While every community in the Soviet Union received education, albeit nominally, in the mother tongue, the Ahiska did not have this opportunity. In 1990, when the Soviet Union broke up, the alphabets were again changed. These changes of alphabet made reading and writing troublesome and people became disengaged from studying. Another problem caused by the change of alphabet was to strain the memory and put people off study.

The absolute authority of Russian also affected the Ahiska Turks more negatively than other communities. In the places that they moved to following the 1944 calamity of exile, the languages spoken (such as Kazakh) were very distant from Ahiska Turkish and not functional. Russian was the *lingua franca* all over the USSR. Even the Kazakhs and Uzbeks were forced to speak Russian. Therefore, the Ahiska Turks were able to speak their mother tongue only at home. They could not use the refined and developed language of Turkish for scientific or artistic activities. When people read with the language and letters they have been educated in, they understand better the things that they read. This, however, meant the dominance of Russian. While daily life flowed in Turkish, official and cultural life continued in Russian.

Binali had this to say about Russian:

"In the Caucasus (he means Ahiska), the men would speak Russian. Women who went to school could also speak or understand it. But our people did not send girls to school if we could help it. Women above middle age did not generally know Russian. Men aged between 17 and 55 went to war, and most of them did not come back. So in the early days of the exile, our people had a language problem in Middle Asia. There was no one who knew the ropes and could guide us."

The problems stemming from not knowing the language of the country they were exiled to also confronted the Ahiska Turks in later periods. Some of the families who were exiled to Kazakhstan, Kyrgyzstan and Uzbekistan moved to Azerbaijan in order to be closer to Ahiska. Since the children of these families did not know the language spoken in the country, they were made to start one or two years behind at the schools where they were accepted. Moreover, following the ethnic conflicts that broke out in 1989 in the Fergana region of Uzbekistan, a section of Ahiska Turks (around ten thousand people) settled in Ukraine and Russia. Malinovskaya (2006), who made a study of those living in Ukraine, recorded that this time, the Ahiska Turks and their children had to learn Ukrainian.

The Ahiska also wished to be educated in the mother tongue in the countries they were sent to, but they were unable to achieve this. Binali had this to say on the subject:

"We also wanted to be educated in the Turkish mother tongue in Uzbekistan, but the state authorities gave us the cold shoulder. They said, 'We too are Turks. We are Uzbek Turks. We are not different. Do not separate two Turks from each other'. We could not press the issue."

Regarding the fact that the Ahiska could not benefit from mother tongue education, which the Soviet Constitution granted as a right to all ethnic groups, Anahanım said, *"They oppressed us so much that we were not able to request anything. In the places we moved to, the rumour was spread that we were enemies of the people. Moreover, to make a request, you had to be literate in Russian."* Narhanım, however, expressed her views on this as follows:

> *"The Ahiska did not make a serious request in this regard. Our people always avoided causing problems. They could not live as a group in certain places in any case; they were dispersed in villages. Russian was the lingua franca in the Soviet Union. In any case, parents who wanted their children to have a good education and be successful in life sent them to schools providing education in Russian."*

Since they are deprived of education in the mother tongue, the Ahiska who try to produce their works nowadays, write their works down with the alphabet that they know and features of the dialect that they speak in the geographical area that they inhabit. Inconsistencies in terms of both the alphabet and spelling appear as a serious problem in Ahiska Literature, which is being revived nowadays. Moreover, since the linguistic features seen in the Ahiska dialect cannot be completely put into writing, the fine points of the language, its richness and its aesthetics, sadly, cannot be fully reflected (Aliyeva, 2015: 441).

Among the Ahiska, the traditional education of the people was to a large extent based on oral culture, and the people who kept this going were the minstrels. Not even the *Âşıklık* (minstrelsy) tradition, which is an important tool of folk education, could withstand time and Russian. In Binali's opinion:

> *"Both entertainments like feasts and weddings, and occasions with words and music which were free time entertainment-education occasions where good manners were taught, gradually lost their importance, because Turkish had regressed. The number of minstrels decreased, or even ended."*

The Ahiska Turks were obliged to learn four different alphabets between the years 1924-1945. The frequent changing of alphabets was one of the reasons why their educational lives were adversely affected. It can be understood that the changes of alphabet were made for the purpose of ethnic oppression or assimilation rather than as a necessity of society. While the alphabets in countries such as Georgia and Armenia were not interfered with in any way in the Soviet Union, the alphabets of the Turkic speaking communities were changed. Moreover, a different alphabet was arranged for each of them, so that the Turkic speaking peoples, who had previously used a single alphabet, came to use 27 different alphabets and scripts (Yıldırım, 2018: 51). As a result of this, the Turkic speaking peoples had difficulty in communicating with one another. The frequently changing alphabets eliminated the ease of reading and made it more difficult. When texts were written in four different alphabets over the years, the burden of having to learn several alphabets at the same time was placed on people.

Besides the alphabet obstacle, the Ahiska Turks had other problems that made their education more difficult. Since they were dispersed in small groups in the areas where they were exiled, their numbers were not enough to request education in the mother tongue. Even when they reached a sufficient number, they were dissuaded from their requests due to bureaucratic negligence. It can be understood that as a people intimidated by oppression, they could not be insistent in their demands. As a result, they were unable to use the right to education in the mother tongue that was granted by the Soviet Union to its citizens. These problems complicated the Ahiska Turks' education processes and led to their disengagement from education.

3.3. Educational Problems Caused by Coercion into Agricultural Labour

In the literature, the findings and interpretations found in works that examine the education problems caused by coercion into agricultural labour following the exile of the Ahiska Turks are as follows:

The Ahiska Turks were scattered in the village *kolkhoz* (agricultural collective) in the areas where they were exiled. Furthermore, they were settled with the prohibition of leaving the villages where they were dispersed "forever". Although this prohibition was lifted in 1956, people were forced to a large extent to reside in the places where they were settled. This means that they were forced to live in villages and into agricultural labour. Pohl (2012: 207) states that the exile of ethnic groups in the Soviet system was a kind of racist employment policy:

> "The similarities between Soviet treatment of the various deported peoples and South African apartheid are significant and stem from policies aimed at confining certain racialized groups to less desirable areas of the country, restricting their movement and using them as a source of menial labor."

The Ahiska Turks were known for their expertise in agriculture and their strong work ethic. These characteristics of the Ahiska and the small population available to work in agriculture in Central Asia must have prompted this exile. Indeed, the Ahiska, who were packed into trains, were dispersed on the skirts of the Tian Shan Mountains in Turkestan, at the rate of one wagonload per village. The regime in the USSR had previously carried out a massacre in Turkestan (İbrahim & Türk, 2016; Güngör, 2018), a heavy population loss occurred in the Second World War, and as a result, the number of people available to work in agriculture had greatly decreased.

While giving an account of the conditions under which they lived in the places where they were settled after the exile, Binali explains it as if it was impossible to conduct education under those conditions. The first task for them was to carry out their agricultural work, and there was no second task to speak of. He discusses the education in the villages where they were settled after the exile as follows:

> "In the exile, they sent us to villages far from the cities and settled us there. There was a primary school in the village, but no high school. For high school, you had to go to the city, but this was impossible until 1956 because they imposed martial law on us[4]. Until 1960, those declared to have ethnic roots as "Turkish" on their passport were not able to register as students at universities or institutes. Even if we wanted to see our relatives in neighbouring villages, we were allowed to go by obtaining a "timed" permit, and even this was not easy to do. In those years, we were not allowed to go to high school. The village was like a prison for us. Martial law was lifted in 1956, but it was still not easy to visit the town. We were 20 km away and there was no transport. There were no accommodation facilities in the town, and the prospect of a 40 km return trip every day was not attractive, either. In the villages, there were no Russians expect for a few state*

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[4] The Ahiska Turks were subjected to martial law in the places where they were settled in the 1944 exile. In a decree of the Supreme Presidium passed on 26th November 1948, it was declared that exiles were to remain in the places where they were settled "forever" and that those escaping from the place of exile to any other place would be sentenced to 20 years' imprisonment. This martial law was lifted on 28th April 1956 by decree no. 135/142 issued by the Supreme Presidium of the USSR. On 31st October 1957, with the statement no. 161/29 signed by K. Voroşilov ve M. Georgadze, it was announced that the Ahiska Turks could settle wherever they wished "outside Georgia", where their homeland of Ahiska was located.

officials. The Russians lived in the cities and education in schools was provided in Russian. The best quality education was also made in Russian."

Paşaoğlu (2012: 50-53) wrote that in Uzbekistan, where he was exiled, he worked in agriculture while still a student, and that they were forced to raise silkworms and work in the cotton fields. *"Many people, from primary school to university students, even office clerks, worked night and day in the cotton fields. (...) We children had no free time, either. We just worked and worked."*

Yasin Seferoğlu, who was born in 1935 in Ahiska, gave an account of his childhood in a documentary study, as follows: *"When the war started, they recruited my father into the army. My mother died. I had six siblings. In the mornings we went to school, and in the afternoons we went to pick cotton. I was working. When I was in 10th grade, we came to Kazakhstan. The living conditions were relatively good here."* (Zeyrek, 2015: 90). Pohl's (2007) study also supports this information.

Pohl (2007: 32 ve 2014: 18) states that the Soviet regime employed almost all (93%) of the Ahiska Turks as agricultural labourers, and that despite the high death rates due to hunger and disease, this type of work was not changed until the death of Stalin. Pohl's account gives rise to the thought that the Stalinist regime regarded the Ahiska Turks as ethnic slaves. Anahanım, after explaining that working in the fields was hard work and that they had to work from the early hours of the morning until the late evening, continues like this:

> *"We had no news of the world outside. How could we? You are in a village, you work night and day, you cannot read or write and you don't know Russian! Women's work was even harder. Besides the children, we had relatives who were made ill and disabled by the bad living conditions during the exile and afterwards. We had to look after them as well. For us, school was a distant dream."*

Peasants live as an agricultural community; they are obliged to remain in an oral culture. They produce from the fields and the orchards. The peasant's intellectual world is limited to his village and nature. The city-dweller, however, proceeds to written culture; he has to receive a school education in order to produce. In this way, he also gets to know the world. This, too, was taken away from the Ahiska. Even so, the system, which made conditions difficult for the Ahiska Turks to study, directed them towards areas as far removed as possible from the social sciences, such as working as an agricultural technician, a medical assistant, a veterinarian or an engineer. Narhanım gives the lack of a role model as the reason why Ahiska Turks stayed away from higher education or were merely steered towards areas like technicianship:

> *"The people that they saw around them and that they could take as a role model were only agricultural engineers or veterinarians. The ideal of young people who wanted a better life was reached in these occupations. They began to do this in the 1980s."*

In conclusion, it can be understood that due to production under the Stalinist regime and also its lifestyle, a policy was pursued which did not allow the Ahiska Turks to develop in an intellectual sense, or which was the reason for this. It was as if the Ahiska Turks were exiled in order to do agricultural work on the collective farms of Central Asia. The obligation to reside in their places of exile "forever" and also the ban on leaving their villages prevented them from wishing to live with different lifestyles or to receive education for this purpose. The obligation to reside where they were "forever" was lifted in 1956 together with the death of Stalin and the corresponding decline in his influence. However, since they had not been

able to leave their villages from 1944 until 1956, they were unable to attend university and their education was obstructed. The fact that even primary school students were forced to work in the cotton fields must have impeded their success in education. The ideal occupation that could be a role model for a student who did not have an adequate knowledge of Russian and who worked under very difficult working conditions, might have been *kolkhoz* chairmanship. To do this, he had to finish school, and since he could not leave the village, he could not go to school. In later years, males in particular began to receive technicianship training in high schools and universities. Until the 1980s, however, these were also rare.

3.4. Educational Problems Created by Ethnic Discrimination

The Ahiska Turks were exiled into cultures that were very foreign to their own culture and were thousands of kilometres away. Before the Ahiska Turks arrived in their areas of exile, rumours had been spread among the native population that they were "enemies of the people" (Kıprızlı, 2019: 90) and "cannibals" (Şirin Öner, 2019: 71). The local communities met the Ahiska Turks with this prejudice, but after a short time, when they realised that the newcomers were not like that and that they even had the same religion, the situation partially changed. The Kazakh, Kyrgyz and Uzbek peoples shared their own poor homes with the newcomers. Even so, the Ahiska Turks noticed this aloof stance. It is understood that the conditions allowed only for thinking about survival. The Ahiska state that they established good relations with the locals within a short time, and that they received their help and support (Şirin Öner, 2019: 72).

Although the Ahiska Turks established good relations, however, they were thrust as a minority into societies where they were foreigners. They were concerned that their children would be brought up with the value judgements of these foreign societies. Instead of sending their children alone to school in the city, they preferred them to remain uneducated with them in the village. They seem to have done this unwillingly. Indeed, in 1957, when they were granted freedom of residence on condition of not returning to Georgia, tens of thousands of Ahiska migrated to Azerbaijan, which was a country where they did not feel alienated linguistically or culturally. Those who went to Azerbaijan attached great importance to high school and university education. Serinaz's family was one of those migrating to Azerbaijan at that time. In fact, Serinaz's grandfather graduated from university in Azerbaijan. Serinaz's mother had this to say:

> *"When our people came to Azerbaijan, it was as if they had come to Ahiska. Even if they settled in villages, they sent their children, even alone, to schools in the city so that they could study at high school and university."*

Anahanım says that those wishing to receive higher education avoided professions like law, public administration and journalism, and steered towards professions such as teaching, nursing, veterinary surgery or agricultural engineering. Although this situation may have stemmed from lack of role models and to not being able to speak Russian proficiently in those years, it may also have been due to ethnic discrimination.

Paşaoğlu, who was a doctor of medicine, stated in his memoirs that they had to work harder than others in order to survive.

"We were torn away from our homeland and brought here as "foreigners". Our 'crime' was being Turkish. They regarded us as a potential danger. (…) If we Ahiska Turks had no worked very hard and had not done our jobs better than others, they would never have made us managers. In Uzbekistan, we were a minority and unprotected." (Paşaoğlu, 2012: 143).

Gazigil, who was a child of one of the exiled families, applied for university education at the law faculty. He successfully passed the exam but he could not gain entry. To find out why

he could not gain entry, he went to the school and spoke to the dean. The dean told him, *"Who are you to come here and demand your rights? This is Uzbekistan and we give priority to Uzbek students. We will not accept you at the school."* In the book in which he wrote down these recollections, Gazigil writes that he consulted a high executive of the Communist Party, and that only with his help was he able to register at university (Gazigil, 2016: 42). However, Gazigil writes that after completing law faculty in 1979, he was accepted for a job, but that because he was Turkish, he encountered obstacles. In the end, he entered an unimportant position (legal consultancy in the telephone administration) (Gazigil, 2016: 74-77). A 62-year-old woman who moved from Kazakhstan to Turkey, and whose views were sought for a different study, says, *"Our biggest problem was the fact that we were Turkish. There was marginalisation. They would not allow us to progress."* (Sürmeli, 2016: 148). Another participant, who was forced to migrate from Uzbekistan to the Russian Federation, shares a similar view: *"It was impossible for Ahiska Turks in Kazakhstan and Uzbekistan to attain important positions in their workplace. The state administrators would never have allowed this."* (Sürmeli, 2016: 149). These people state that they had good neighbourly relationships and established friendships in the societies in which they lived, but that alienation was experienced to a large extent at school and in the workplace.

The fact that the Ahiska Turks' problems continued with regard to education is revealed in a study conducted in 2012. A high school student in Kyrgyzstan related the following:

> *"At school, they treat us as foreigners. 'You are Turks, beware and go away', they say. They treat us badly next to the other students. This is very painful for me. I want to learn but I don't want to go to school. It would be better to stay in the village."* (Sağır, 2012: 73).

Narhanım, after stating that "the Soviet education system created solutions for improving the education of minority groups", says that "when it came to the Turks, this principle was ignored." Narhanım had this to say on the subject of discrimination:

> *"At the time of the Soviet Union, the way was always clear for a youth who finished school with a medal and continued with university education, but the Ahiska were given bad grades in most baccalaureate exams and finished school without a medal so that they could not benefit from such a right. Moreover, many examples of discrimination can be given. They always encountered this statement: 'Could there ever be people among you Turks whose minds work?' This statement was always made insultingly and sarcastically."*

Jazira Sayin (2019: 728) wrote that "In the Soviet period, the Ahiska Turks' rights to higher education was ignored. In those years, the number of Turks among those working in public institutions was low, and they were among those who registered their own ethnic names in Azerbaijani." After explaining that being Turkish in the Soviet Union was a disadvantage, Sayin wrote that after Kazakhstan became independent, young Ahiska Turks were able to receive more higher education both in Kazakhstan and abroad.

The Ahiska community were a community that lived by their traditions, and they displayed many characteristics of traditionalism. In traditional societies, there is no equality between men and women like there is today. Male-female division of labour occurs in which male norms are dominant. In this division of labour, women stay at home and are considerably excluded from social life. When the lifestyle is like that, the education of girls at school becomes unnecessary. Families act in this way, and do not wish to send their girls to school when it is not compulsory.

In the literature, in works that examine the consequences of ethnic discrimination caused by the Ahiska Turks' living in foreign cultures, the findings and relevant interpretations are as follows:

Every society moving from the traditionalism of agricultural society to the modernisation of an industrial society assumed a conservative attitude in terms of preserving their traditions and were opposed to moving towards a status of equality for women in social and legal aspects. This situation also applied to the Ahiska Turks. Indeed, it is seen that the Ahiska showed more resistance towards their girls attending school than the Turks of Turkestan. The nationalities policy of the Stalinist regime forced the Ahiska to preserve their identity, which obliged the Ahiska to be conservative. They paid the price for this by taking their girls out of school. Binali, who is one the first-generation exiles, gave the following account of the education of girls:

"The Ahiska in Uzbekistan did not send their girls to high school or higher education. They married them off early. There are two reasons for this. The first was conservative attitudes, the idea that we should preserve our culture and not resemble others. This was an anti-assimilationist attitude, and when we look at it now, it appears to have been successful; the Ahiska were not dissolved and lost. The second reason was that the schools were very far away and in the cities, and there were no facilities like dormitories for girls, or if there were, the Ahiska were not aware of these facilities.

Until the 1980s, there were very few girls who studied at university, but later, Ahiska girls began to study en masse. During the years 1972-1978, only two Turkish (Ahiska) girls studied in Tashkent. Girls who studied were not regarded favourably, and it was believed that they would not be good wives when they got married. However, in the Soviet period, there was shame and honour. Now there are hardly any morals left. The communists valued women. The Russians educated all their girls, the Uzbeks educated them in the cities, while the Ahiska kept them away from school as much as possible.

As long as we failed to educate our girls, we lagged behind compared to other communities. We did not have any artists, composers, performers or scholars, either. We were not involved in civilisation, and we even became unable to hold weddings."

Anahanım, however, states that because her mother died when she was still at school, she was taken out of school to deal with housework and her siblings, and that she was very upset about this:

"I loved school. I went to school in secret a few times without my father's knowledge, but my father was very angry about this. I was never able to go again. I examined the notebooks and books of my friends coming from school, and I studied the subjects that they learned at home. The following year, I was determined to go to school, but they did not send me that year, either. After getting married, I finished school externally while working on the collective. I worked as an accountant on the kolkhoz and retired from there."

Anahanım continues as follows:

"Girls were under excessive pressure. They set a course for us by frequently saying 'You are Turkish, you cannot behave freely like the other girls. Finish compulsory school and get married.' There were many relatives around; in fact, the whole Ahiska community was like each other's relatives. We both protected

each other and children who were a little free grew up under the constraint of this strict social control."

Binali describes the negative effects of traditions on modern education like this:

"One of the reasons why the Ahiska distanced themselves from education in the first years was our traditions. Girls were not educated apart from compulsory education. Among boys, too, the youngest son was not educated as much as possible. According to our traditions, boys get married and leave home. The youngest son, however, would always stay with the family and look after his parents when he got older. For this reason, they were not sent to school. That was also the case for me. I was married off early and lived with my family. When my father died young, I was able to realise my dream of studying at university."

Şirin Mamaserikova, who is one of the most important poets of Kazakhstan, is a person who was both a teacher and worked for many years as an education manager in the district of Merki. In an interview, while stating that people in that region did not look kindly on the education of girls but that they were persuaded over time, she explained that the Ahiska Turks were very conservative and that they needed more time to be persuaded (Çınar, 2016). Anahanım and Narhanım reported that the state was effective with regard to compulsory elementary education. For example, Narhanım stated:

"Efforts were conducted towards providing elementary education for all individuals who lived in the Soviet geographical area. 'Compulsory education' was completely implemented with the declaration that persons who did not send their children to school would be punished by the law. In the 1980s, Ahiska girls who finished school began to form a desire to obtain higher education as well. Parents who did not want their children to do heavy work supported their children. All the same, most girls were married off without continuing their education."

However, this situation was different regarding university. Indeed, Narhanım, who wished to come to Turkey to be educated at university when the USSR broke up in 1991, explains the opposition of her family and of the Turkish community who lived in her town towards this move as follows:

"I wanted to study at university in Turkey. But kindredship was very important for us, and our relatives were against my coming to Turkey. Turkey was a distant place, they did not know anything about it, and most important of all, I was a girl! They did not let girls go free. However, my father was determined to educate me, and he made the final decision."

Narhanım explains what it was like to be a girl in an Ahiska Turkish family from her own point of view, like this:

"It was a disadvantage to be a girl in Ahiska families. Girls were obliged just to go to school, take part in compulsory activities, and return home. Developing their skills in different areas like art and sport was not wanted. Girls were brought up as housewives and for this purpose, they were not supposed to open up to the world. Parents and the Ahiska community monitored the girls more closely. At high school, I was successful in sports competitions and use of weapons, and this success was reported together with photographs in local newspapers. I kept it secret from my family, but my mother read it in the newspaper, and instead of being congratulated, I was scolded."

One of the hidden reasons for the exile of the Ahiska community was to employ them as agricultural labourers. Therefore, they were sent to the villages in the exile and allowed to maintain their existing lifestyle. Most of the villages where the Ahiska were settled were a long way from cities. Being far from the city meant that it would be very difficult for them to receive high school and university education, even if they wished.

In the USSR, the name of ethnic groups was written in their identity documents. The Ahiska Turks were marked as "Turks" as an ethnic group in their identity records. Furthermore, Soviet school history books gave a lot of space to the historical Russo-Turkish Wars and imprinted the Turks as "historic enemies" in the minds of their students (Maharramova Cengiz & Şimşek, 2017). In Russia, "the Turk" was perceived as "the enemy within". As a result, even an ordinary Russian was put on the alert when it came to the Turks. Binali's experiences can be given as an example of this:

Through his own personal effort, Binali met with Raşidov, the President of Uzbekistan, and with his support, registered at university, graduated with success, and was appointed as a teacher. *"But I could not establish good relations with the school's Russian managers. They were disturbed by the fact that I was Turkish and they made me uncomfortable. A few years later, I was forced to abandon the teaching profession. I became a journalist and so on."* Narhanım also attributes the fact that the gold medal she was awarded on finishing high school was somehow taken from her and given to a student who was Russian, and also that she was prevented from passing the university exam, to the fact that she was Turkish.

The Ahiska Turks were settled in the areas to which they were exiled as "enemies of the people" or "traitors", and were forced to live under martial law. In later periods, too, it was rare for them to be promoted among state staff other than occupations like *kolkhoz* manager, simply because they were ethnic Turks. The Turks did not force this issue, either, since the Ahiska Turks did not join the Communist Party, and stayed away from it, as they were angry or resentful towards a political system that oppressed them. Yet those who were not members of the party could not be promoted to management or senior duties. In this way, the Ahiska Turks became distanced from politics and management. As a natural consequence of the situation, the Ahiska Turks were unable to rise to the higher levels of society. In her interview, Narhanım had the following to say:

> *"Since I finished school with honours, after high school, the Communist Party invited me to become a member of the party. When I told my father about the invitation, he grew angry. 'If you become a member of that I will break your leg', he said. I also heard others say, 'They (the Communists) deported us from the Caucasus, from our homeland, and broke up our home. Stay away from them. It was the Communist Party that exiled us, and Stalin was at their head.' A wall was erected against the Communist Party in Ahiska society. A mentality of 'Let them keep away from us, let's not suffer any more harm; we don't want their benefits, either' predominated. Since the Ahiska were not generally in favour of becoming Communist Party members, they were unable to rise to higher positions other than in types of management such as kolkhoz management, because in the first years, they were a 'penalised community', and in later years, they did not become party members."*

Narhanım, who narrated the above recollection and observation, still works in Turkey as an academician, and when she recalls her time as a student in the period of the USSR, she expresses the ethnic discrimination she was exposed to as follows:

> *"Just when I was about to finish high school with a gold medal, things happened at the last minute that I could not understand, and I missed the medal; they gave it to a Russian student. I took the university exams twice in two years, but I could not get into university. I attribute my lack of success to two reasons: firstly, because I did not give a bribe, and secondly, because I was Turkish. The fact that my ethnic origin was recorded as Turkish in my identity document was a disadvantage."* This statement indicates that there was prejudice during the period of the USSR.

Following the break-up of the USSR, too, the Ahiska Turks were subjected to similar treatment by the Kazakhs, who had learned the role of "dominant society" from the Russians. The Ahiska Turks reported that even the Orthodox Russians lived more comfortably than they did, that they were subjected to discrimination, and that even certain procedures that were simple for the Kazakhs and Russians in government offices were made more difficult for themselves (Ağır, 2017: 79). A similar situation can be stated for Kyrgyzstan and Uzbekistan.

Binali expresses the ethnic prejudice and the attitude that they themselves adopted against ethnic discrimination as follows:

> *"We also educated the children at home on every subject. First and foremost was identity... We advised the children to remember that 'We are not Uzbek or Russian; we are Turkish and Muslim. Take care with your demeanour and your actions, travel on the right road, and don't give our community a bad name,' and we would keep tabs on the children outside as well. (We did this) not only for our own children, as we counted all children of the Ahiska as our own children. Over there, we had to give an impression of unity in order to display our differences as Ahiska and to appear strong against possible alienation."*

Binali's observations and opinions are also supported by Aydıngün & Aydıngün (2015: 139). According to the writers, the Ahiska Turks were able to maintain their existence by developing their survival strategies with the most extensive family ties. In this family, children of siblings (cousins) were accepted as siblings, and spouses of siblings and even their families were included within the conception of the family. In this way, in a family type, "values such as the success of the family and prestige of the family name were placed ahead of individual freedoms. In return for the restriction of their freedoms, individuals were given a great deal of both material and spiritual support." (Aydıngün & Aydıngün, 2015: 140)

Serinaz, who was the fourth source person, is the nine-year-old girl of a family who came to Georgia as "citizens" after the break-up of the Soviet Union but were not allowed to settle in Ahiska, and who settled in a village near Batum. The family have problems with adaptation in Georgia. Looking at her family history, it can be thought that Serinaz's bad luck will continue.

Serinaz's great grandfather was exiled from Ahiska to Uzbekistan. Her grandfather was born in Uzbekistan. When he grew up, they moved to Azerbaijan since it is close to Ahiska. Serinaz's mother was born in Azerbaijan. When the Soviet Union broke up, they moved to Georgia. The family could not study due to poverty. Serinaz's mother does not have a diploma of any kind. She can read and write, and speaks a little Georgian. They have a scattered family, with relatives in Uzbekistan, Ukraine, Russia, Azerbaijan, Georgia and some cities in Turkey.

Serinaz lives with her mother, grandmother and a brother aged 7. Her mother works in Bursa as a clandestine worker. Her father is an alcoholic and drug addict. As he was involved

in certain crimes, he was deported for a period of 5 years. Since her family problems were continuing and she did not have Turkish citizenship, Serinaz was not able to register at school for two years despite reaching school age. By chance, a benefactor noticed the situation and gave assistance to this family. Therefore, Serinaz and her brother Ahmet were able to register at school.

Serinaz is two years older than her classmates. She says that this is not a problem. She is top in her class. Her teacher is apparently very fond of her. When she grows up, she wants to be a teacher. One issue she complains about is that her brother is bullied by his classmates because he is foreign (!)

The Ahiska Turks began to experience ethnic problems following their exile. These occurred in two ways. The first was that they were put under pressure by the large ethnic groups around them. The second was problems due to withdrawing into themselves and conservatisation in order to protect their own values. Both of these were reasons that complicated or even prevented the education of Ahiska Turkish children and youth. The Ahiska Turks believe that they encountered ethnic discrimination and that this prevented them from climbing the career ladder.

In the Soviet Union, every citizen's ethnic origin was written in their passports. It can be understood that the Ahiska Turks' declaring themselves to be "Turkish" caused them to encounter further discrimination. The reason for this may be due to history education or to the imprints left in the collective memory by the historical Russo-Turkish Wars. Russian history is like the history of the struggle with the Turks. The Ahiska "Turks" must have been understood as the enemy. It is seen that some Ahiska Turks declared themselves as "Azeri" in order to overcome this pressure and obstruction. Yet all things considered, they were a large group of people who insisted on their "Turkish" identity. Young people who grew up in this environment could not be ambitious in their educational careers.

The Ahiska Turks' avoidance of politics also prevented them from integrating with the system and moving up the career ladder. Following the calamity of exile, they became angry and resentful towards the Communist Party. It can be said that they distanced themselves from the Party by adopting a passive attitude. This, however, was the biggest obstacle to promotion.

The Ahiska Turks became more conservative in order to protect their own cultural values against others in the place of exile. This, however, resulted in girls especially becoming distanced from education. To sum up, various consequences of ethnic discrimination inflicted a heavy blow on the education lives of the Ahiska Turks.

4. Discussion, Conclusion and Suggestions

The city of Ahiska (Akhaltsikhe) was the centre of the Pashalik of Akhalzik or Eyalet of Childir at the time of the Ottoman Empire. During the Russo-Turkish Wars, it frequently changed hands, and finally, Ahiska and the surrounding area were ceded to Russia (later Georgia). However, the provinces of Ardahan, Kars, Artvin and Erzurum, which belonged to this region, remained in the Ottoman Empire (later Turkey). The community that lived in this area was split up. The Ahiska Turks were the Turkish community which remained in Georgia and which is the subject of this research. In 1944, the Turks who lived in Ahiska, and the smaller ethnic groups of Kurds and Hamshenis who accompanied them, were suddenly exiled to Uzbekistan, Kazakhstan and Kyrgyzstan. As Pohl (1999) revealed, the exiling of the Ahiska Turks was one of the ethnic cleansings carried out by the Stalinist regime.

Exiled communities suffer great losses within a short time in many areas, such as language, history, art, culture, empirical knowledge, health and population. These lead to

psychological traumas. The Ahiska Turks also suffered many losses, principally in population, during and after the 1944 exile, due to the bad living conditions that they encountered. This situation shows parallelism with losses experienced by other exiled communities (Ediev, 2003: 265; Alam, 2019). One of these losses was in education. In this research, the educational losses that occurred due to reasons stemming from the exile of the Ahiska Turks were investigated. Education enables a society to maintain its existence by developing its human resources. It was revealed that for reasons originating from their exile, the Ahiska Turks were unable to benefit sufficiently from education for several generations. Moreover, the people whose views were consulted in the research, and written sources that support their views, revealed tragic results of the exile.

Due to the exile and its consequences, the Ahiska Turks had difficulty not only in developing their qualities by receiving a good education, but also even in transferring their cultural heritage. As a result of this, they were unable to produce important scientific, cultural and artistic works during the period of exile. Not only were they unable to learn their own history and culture, they were also unable to explain their own civilisation to others. For this reason, they were subjected to alienation in the society in which they lived, and even to massacres (such as the 1989 Fergana pogrom).

Because of the educational obstacles, Ahiska Turks suffered losses in basic areas such as language, literature, art, science and culture. This situation was due to their being an ethnic minority group punished with the sentence of exile.

A significant percentage of the intellectuals and opinion leaders raised by the Ahiska Turks were eliminated with false accusations such as that they were anti-regime, land barons, bourgeois nationalists or Panturkists. Not only were these revealed to be slander in revised judgements made after the death of Stalin, the exile was also accepted as a political slander (Zakon, 2020). Thousands of literate people were annihilated during the years 1930-1938 even though, far from being anti-regime, they supported the socialist regime. In this way, the number of educated people who could guide society decreased significantly. Men up to the age of 55 who were literate, who were better able to use Russian, the official language, and who knew the functioning of the system in the country, were recruited into the army and sent to fight in the Second World War. While the men were serving in the Russian army, their families were exiled to areas thousands of kilometres away with the label of "enemy of the people". The people who were exiled on 14th November 1944 were generally poorly educated, illiterate and monolingual women, children and old people. These people were unable to guide their children educationally during and after the exile.

The Ahiska Turks' alphabet was changed at least four times during Stalin's time. These changes were not due to the needs of society, but stemmed from the assimilationist policies of the regime. In their study, Bugai (1992) and Yemelianova (2015) also revealed the consequences of these policies. The consequences of this were that reading and writing became more difficult, people were unable to read printed documents and books from the past, the culture of reading was weakened, and reading became a burdensome task. Even this situation alone can seriously disrupt a society's education life and consequently, its quality of life as a whole.

In their places of exile, the Ahiska Turks were settled in small groups in villages. Since there were numerically very few of them in each village, they were unable to receive education in the mother tongue, a right normally granted by the Soviet regime to all its citizens. Due to being intimidated by oppression and to being branded as "guilty people", they could not insist on requesting a number of rights. Despite having a developed mother

tongue, they were prevented from using this when educating their children. This situation also prevented the Ahiska Turks from gaining the expected returns from education.

The Ahiska Turks were forced to become agricultural labourers and to remain so. From 1944 onwards, they were prohibited from leaving the villages where they were settled without permission and were forced to live there "forever". This decree was lifted in 1956. During this period, they lived a camp life under very difficult conditions. Even elementary students were made to work in the cotton fields. Even if there was a primary school in the village, young people could not receive education at high school or university, and thus, they were prevented from being educated. Just as they were unable to benefit adequately from education, first-generation exiles, who did not know Russian sufficiently, also lived in a restricted world without a role model in the village, and living in this limited world on the *kolkhoz*, they grew up deprived of knowledge of what other occupations and lifestyles were like.

In the Soviet Union, people's ethnic origins were written in their passports. For historical reasons, "being Turkish" in Russia caused them to be placed in the category of a captive people or an enemy community. Because of oppression, some Ahiska Turks were forced to declare their own ethnicity as "Azeri" (Sayin, 2019). Prejudices such as these also prevented the Ahiska Turks from moving up the career ladder. Due to pressures and assimilationist policies like these, the Ahiska Turks were obliged to become more conservative. They became a community that especially maintained the feudal community values of the middle ages, kept within the bounds of old traditions that should have been surpassed with time and clung more tightly to them, and did not give importance to school education, especially for girls.

The Ahiska Turks were prevented from raising their intellectuals, and were unable to put their intangible cultural values into writing and record them. This led to a significant loss of culture. Since the Ahiska Turks could not establish warm relations with the Communist Party who had sent them into exile, they could not participate in management, move up the career ladder, or defend their rights in legal environments. All of these originated from the exile.

In conclusion, the Ahiska Turks, who lived in the Ahiska region of Georgia at the time of the Soviet Union, have still not escaped from the heavy consequences of the exile that they experienced under the Stalinist regime in 1944, or from the state of exile. The situations revealed in the details given by certain researchers from Russia support the findings of this study (Bugai, 1994; Yemelianova, 2015; Akkieva, 2018). In this study, in which the educational consequences of exile have been investigated, the education of the Ahiska Turks was hindered by the loss of their intellectuals, the complication of literacy for them, their conversion into forced agricultural labourers, and their subjection to ethnic oppression, and in this way, they became a community whose individual and communal development was severely disrupted.

A section of Ahiska came to Turkey, and they have now made themselves at home. They can speak about and relate their experiences freely. The type of educational and intellectual barriers that the Ahiska have faced should be revealed with comprehensive studies in which the recollections of Ahiska are compiled. The fact that the Ahiska were forced to become more conservative due to the conditions of exile has kept their collective memories active. The recording and documentation of the memories, traditions, values and folkloric products that the Ahiska have stored in their collective memories awaits interested researchers.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

Ethics committee approval was received from Kafkas University (No. 28644117-905.02/35)

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PROBLEM POSING AND PROBLEM SOLVING WITH SCIENTIFIC APPROACH IN GEOMETRY LEARNING

Research Article

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Abstract

Geometry subject that prosecute students to comprehend abstracts things is one of the causes of students' difficulties in mathematics learning. This study aims to determine the effect of Problem Posing and Problem Solving learning models with the Scientific Approach to students' adaptive reasoning on plane figure materials. It was conducted at the State Junior High School (SMPN) 4 Magetan, Indonesia. It employed quasi-experimental research methods. The populations were the seventh grade students with a total sample of 64 students who were divided into 34 students as experimental 1 class and the other as experimental 2 class. The simple random sampling method was chosen as the sampling technique. Moreover, normality test was the Lilliefors method; homogeneity was the Bartlett test; and t-test for research results analysis. The results revealed that the Problem Posing learning model with the Scientific Approach was better than Problem Solving with the Scientific Approach. It significantly enhanced students' adaptive reasoning on plane figure materials. The Problem Posing learning model with the Scientific Approach provided the needed skills to build knowledge, where students performed the process of observation, clarification, measurement, prediction, and hypotheses. Therefore, the model was appropriate for mathematics learning, especially on plane figure materials to increase students' adaptive reasoning and achievement.

Keywords: problem posing, problem solving, scientific approach, geometry learning, adaptive reasoning

1. Introduction

The branch of science that plays a significant role in the world of education and life is mathematics (Schmitt, 2006). Students can think logically in solving problems through geometry learning (Van de Walle, 1994). Geometry helps people to achieve their goals, makes them easier to think and get solutions in everyday life (Hızarcı, 2004). It also helps them to understand other topics, such as to understand the concepts of division and decimals, find the area of rectangles, squares, and circles, and it is also carried out to teach mathematical operations techniques (Hamdi, 2018). Applying the right concepts and formulas in solving problems, is one indicator of achieving the goals of learning geometry. Efforts that can be made to meet the aims is an increase in adaptive reasoning to build knowledge in the learning process (Riyanto & Siroj, 2011).

The students with good adaptive reasoning can create conclusions rationally, guess and give the answer rules along with calculating their validity mathematically (Kilpatrik, Swafford, & Findell, 2001). Adaptive reasoning is a basic element in understanding a problem topic and building ideas in determining the evidence of the problem because it is the glue that holds all mathematical abilities together, including as a guideline in learning activities. However, the fact shows that most students still experience difficulties in geometry learning (Adolphus, 2011). Learning geometry, especially on plane figure materials require students to comprehend abstracts things, is one of the causes of students' difficulties. Specifically, for the seventh grade of Junior High School at the material of flat structure includes triangles and rectangles that discuss the nature, circumference, and area of the building. Several studies have shown that the level of basic geometrical thinking in secondary education students is below the expected level (Alex & Mammen, 2012). Factors affecting students' difficulty in understanding problems related to the discussion of various types of shapes, one of which is that teachers do not precisely apply learning in class. The teacher becomes the main focus in the learning process, it can be said that the teachers still employ conventional method (Komalasari, 2012). This makes the students play less role to building knowledge that should be obtained and lacking enthusiasm during the learning process. Therefore, innovation and changes in the learning process must be done by the teacher, especially in choosing a learning methods to motivate the students to build their own knowledge to improve adaptive reasoning.

The geometry material in the learning process requires innovation from the teacher to choose and apply proper learning models along with supporting the students. Besides, the model chosen should be able to make students more active and think creatively, especially when facing problems in finding solutions (Kar, 2016). As an effort to realize changes in the learning of geometry, the possible learning model that can be used is Problem Posing and Problem Solving. Problem Posing and Problem Solving are two of the many innovative learning models that focus on the activity of the students in solving problems. On the other hand, Problem Posing and Problem Solving also have differences, Problem Posing requires students to be able to redefine the problems that have been given with the aim of improving the understanding and facilitate students in solving problems (Arikan & Unal, 2015), while Problem Solving more emphasizes on the steps of Solving problems that are logical and systematic. The Problem Solving relies on the competence to formulate problems and ways of conveying learning that supports students to solve problems as learning objectives (Hamdani, 2011). In this 21st century, one of the important parts in mathematics is a skill in Problem Solving, it is also one of those the competencies that are very much-needed (Permata, Kusmayadi & Fitriana, 2018). In the process of solving problems, the students gain experience to apply their knowledge and skill (Prismana, Kusmayadi, & Pramudya, 2018) and it can stimulate students' logical and systematic thinking patterns. The teacher is not only the source of information, but also the students are encouraged to dig up information from prior knowledge. It is expected that the students can solve problems in their lives using knowledge gained after learning mathematics (Ojose, 2011). But in practice, Problem Posing and Problem Solving still has shortcomings, such as the students have not been able to use their knowledge. To overcome the problems, the teacher needs to change the Problem Posing and Problem Solving learning model with an approach that allows students to use their knowledge comprehensively.

The Scientific Approach is one that can be chosen as an approach because it can produce more meaningful learning when it is applied in integrated learning. The scientific learning process is very important for students by learning concepts and providing the needed skills in learning. Besides, it gives more opportunities for students to explore, elaborate, and actualize their abilities (Rusman, 2005). Therefore, learning scientifically involve several activities

where the students make the process of observation, clarification, measurement, prediction, and making hypotheses (Balfakih, 2010). The students must also master process skills to elaborate knowledge about the situation in the environment, be scientific to solve the problems that they face every day (Yuselis, Fajri, & Rieno, 2015), and make observations and analyse activities in practice as a way to get learning outcomes (Mwelse & Wanjala, 2014).

Problem Solving and Problem Posing learning models with the Scientific Approach makes students actively use their knowledge and think thoroughly according to scientific principles. Likewise, geometry plays an important role in solving various problems in life. Therefore, the Problem Posing and Problem Solving leaning models with the Scientific Approach are very interesting to study to investigate its effect on geometry material in improving students' achievement, so that it is beneficial for students' lives.

2. Methodology

This research employed quasi-experimental method. It required two variables namely; the learning model as an independent variable which is divided from the Problem Posing learning model with the Scientific Approach to the experimental class 1 and the other as an experimental class 2, and students' adaptive reasoning on geometry as the dependent variable. Adaptive reasoning in this study is adaptive reasoning on the plane figure materials which was measured using descriptive tests for all indicators (Analogy Reasoning, Conditional Reasoning, Categorical Syllogical Reasoning, Classification Reasoning, and Linear Syllogical Reasoning) adaptive reasoning. When it was related to the revised edition of Bloom's Taxonomy Theory, the matter of adaptive reasoning in this study was employed to measure the dimensions of C4 cognitive processes (analyze). Expert judgment was applied to assess whether an instrument had high validity or not. Experts assessed whether the blueprint made by the test developer represents the content and the concept, and assesses the suitability of each test item with the blueprint made. The validity of this adaptive reasoning instrument consisted of the validation of the blueprint and the test items which include the validation of the blueprint and the validation of the test items. This validation was done by filling out, giving comments, and advising for improvement on the validation sheets that had been available by three validators. In addition to validation, an item of difficulty level calculation with the criteria of $0,3 \leq P \leq 0,7$ and discriminant $r_{pbis} \geq 0,30$ was also analyzed. The instrument reliability test was also an instrument that can be said to be reliable if the reliability coefficient is $r_{11} \geq 0,70$. In this study, the reliability test employed Cronbach Alpha formula. It was organized at the State Junior High School 4 Magetan, Indonesia. The population was all students in seventh grade in the academic year of 2019/2020. There were 308 students, so the sample consisted of experimental 1 and experimental 2 classes using the simple random sampling method. The samples in this study were 64 students, 32 as the experimental 1 class and 32 as the experimental 2 class. The 64 students were taken randomly as samples; sampling was done without returning, so that each student had the same opportunity to be selected as a sample with a homogeneous population. The research run from November 2019 to February 2020 through three steps. The first step is in December 2019 by preparing and requesting research's permission. Then the second step is from December 2019 to January 2020 by implementing the research and the last step is in February 2020 for obtaining the data. The data in this study were obtained from students' adaptive reasoning test instruments on the geometry material which were carried out before the treatment (pretest) and after the treatment (post-test). To find out if the sample is from the same population, normality and homogeneity tests were done using the Lilliefors and Bartlett tests from students' adaptive reasoning pretest data. The research hypothesis test used the data obtained from the post-test results of students' adaptive reasoning with the t-test. All tests were carried out with a significance level of 5 %.

3. Findings and Discussion

The instruments for the pretest and posttest in the experimental class was tested for the level of difficulty and reliability to obtain several questions that met the criteria for the level of difficulty and reliability with Cronbach Alpha. The data obtained from the results of the students' pretest both in the experimental and control classes were tested to determine the sample from a population that was normally distributed and had a homogeneous variance.

3.1. Normality Test

The normality test in this research was the Lilliefors test with a significance level of 5 %. The results of Lilliefors were presented in the following table.

Table 1. *Result of normality*

Group	L_{obs}	L_{table}	Test Decision	Conclusion
Experimental 1	0,0877	0,0914	H_0 is accepted	Normal
Experimental 2	0,0832	0,0914	H_0 is accepted	Normal

Table 1 showed that the results from the experimental 1 class was 0,877 and the experimental 2 class was 0,832 and $L_{table} = 0,0914$ on the normality test $|L_{obs} < L_{table}|$ or $L_{obs} \notin$ DK means H_0 was received. This showed that the students' pretest data on geometry material came from normally distributed populations.

3.2. Homogeneity Test

The homogeneity test in this research was the Bartlett test with a significance level of 5 %. The results of Bartlett were presented in the following table.

Table 2. *Result of homogeneity*

χ^2_{obs}	χ^2_{table}	Test Decision	Conclusion
2,313	5,991	H_0 is accepted	homogeneous

The calculation of homogeneity tests revealed that $\chi^2{}_{obs} < \chi^2{}_{table}$ which was $2,313 < 5,991$ which means that H_0 was accepted and the population had homogeneous variance.

3.3. Univariate Test

Hypotheses test the in the research was conducted using the t-test on students' pretest and post-test geometry material after the prerequisite tests are carried out. The results can be seen in table 3.

Table 3. *Pretest, post-test data and t-test*

Groups	N	Mean		t_{obs}		t_{table}
		Pretest	Posttest	Pretest	Posttest	
Experimental 1	32	77,96	80,46	2.348641	5,108714	-1,998972 or 1,998972
Experimental 2	32	77.09	78.40			

Table 3 showed that the mean of pretest scores in the experimental class were 77,96 and 77,09 for the control class, while the mean of post test scores for the experimental 1 and experimental 2 classes were 80,46 and 78,40 respectively. Furthermore, it was also obtained $t_{obs\ pretest} = 2.348641$ and $t_{table} = (-1,998972$ or $1,998972)$ for critical areas $DK = \{t | t < -1,998972 \ or \ t > 1,998972\}$. So, we got $t_{obs\ pretest} \in DK$ and it could be concluded

that *H₀* was rejected, which means that there were significant differences in adaptive reasoning in the experimental 1 and experimental 2 classes before being given treatment. While the experimental 1 and experimental 2 class post test data showed that the value of $t_{\text{obs posttest}} =$ 5,108714, this means $t_{\text{obs posttest}} \in DK$ so that it could be concluded that *H₀* was rejected, which means that there were significant differences in adaptive reasoning in the geometry material of experimental 1 and experimental 2 classes after being given treatment.

Based on the data and the results of the research, the experimental 1 class got a better score in adaptive reasoning than the experimental 2 class after receiving the treatment. The researcher thought that experimental 1 class employed Problem Posing learning models with the Scientific Approach. The increase of students' adaptive reasoning in the experimental 1 class provided a positive impact of modifying the Problem Posing model with the Scientific Approach, especially on geometry material. Compared to the experimental 2 class that is subjected to Problem Solving model with the Scientific Approach, the experimental 1 class has improved better. Several factors cause an increase in students' adaptive reasoning after learning the Problem Posing model with the Scientific Approach were (1) The learning process made the students more active and increases their motivation to learn. This is because the principle of learning is to place students as active subjects and through scientific stages, in the process of learning knowledge students get from the knowledge they have. So, students can build new knowledge and integrate with previously owned knowledge (characteristic of the Scientific Approach: student-centered learning). (2) The students were better able to solve problems systematically and thoroughly. This is because in learning Problem Posing models with the Scientific Approach, they are invited to collect, process, and communicate information obtained from various sources to get conclusions in the form of knowledge (characteristics of the Scientific Approach: developing students' potential and using scientific processes in building knowledge). (3) The students found it easier to solve various levels of difficulty of the questions. This is because the learning process conditions are created so that they feel that learning is a necessity. Besides, it also train students in expressing ideas, and improve students' learning outcomes through cognitive processes and higher-order thinking skills (characteristics of the Scientific Approach: Involving potential cognitive processes in stimulating the development of the intellect). (4) The students tend to be better at developing each talent and skill. This is caused by the freedom given for students to form knowledge through observation, communicate and discuss by forming small groups to shape the character of discipline, responsibility, and care (the characteristics of the Scientific Approach: developing students' character).

The data in the experimental 2 class that was taught using Problem Solving learning models with the Scientific Science Approach showed that there was no significant increase in value. This revealed that there was something missing in the learning process. Furthermore, it can be seen that the students in experimental class 1 in the post-test experienced much higher adaptive reasoning than those in experimental class 2. This was because students in the experimental class 1 were asked to reformulate a new problem that was similar to the problem given, so that they were required to think more extra in understanding the material being taught to formulate new problems that were similar to previous problems.

Based on these explanations, the Problem Posing learning models with Scientific Approach provided a better impact than Problem Solving learning models with Scientific Approach on students' adaptive reasoning, especially in the geometry of plane. This is supported by a research by Abadi, Pujiastuti and Asaat (2017) that the application of Problem Posing learning in learning geometry can make students' adaptive reasoning increase much.

4. Conclusion

The results showed that the students who used the Problem Posing learning model with Scientific Approach experienced an increase in adaptive reasoning significantly. So, it could be concluded that Problem Posing learning model with the Scientific Approach was better than Problem Solving with the Scientific Approach and it significantly enhanced students' adaptive reasoning on plane figure materials. Therefore, the Problem Posing learning model with the Scientific Approach is appropriate to be applied to enhance the adaptive reasoning of students in learning geometry, especially plane figure materials so that the students' learning outcomes can be improved.

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE QUALITY OF ARABIC LANGUAGE TEACHING CURRICULA IN TURKEY IN ACCORDANCE WITH THE TURKISH QUALIFICATIONS FRAMEWORK

Research Article

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Abstract

The European Qualifications Framework (EQF) was released in 2008 by the European Parliament and the Council of Europe for Lifelong Learning purposes. Thirty-six countries that are members of or in the process of the membership to the European Union (EU) have prepared their own national qualifications framework in accordance with the EQF. In Turkey, this framework was prepared by the Vocational Qualifications Authority (MYK acronym in Turkish). The aim of the study was to examine the reflections of the Turkish Qualifications Framework (TQF) on the Arabic language teaching curricula in Turkey. Therefore, the study investigated whether Arabic language teaching curricula released by the Ministry of Education Board of Education, Turkey in 2016 and in 2018 were developed in accordance with TQF. In this qualitative study, the Document Review Method was adopted. The data were analyzed via content analysis. As a result of the study, it was observed that TQF was not aligned explicitly or implicitly to Arabic language teaching curricula. Meanwhile, in some parts the objectives were incidentally similar to the competencies in TQF, but not the same at all. The study discussed some major deficiencies, and put forward some recommendations in order to overcome them in the forthcoming Arabic language teaching curriculum studies.

Keywords: European Qualifications Framework (EQF),Turkish Qualifications Framework (TQF), Arabic language teaching curricula, Turkish Ministry of National Education (MoNE)

1. Introduction

The goal in education is to lead to expected changes in the knowledge, thoughts, attitudes, feelings, movements of the students at the end of the educational activities (Ertürk, 1974). Today, curriculum developers carry out detailed studies on educational goals and behaviors. They publish about the concept of "qualification-based goal" related to objectives which are the main components of a curriculum, and the essentials of transforming the goals into measurable student behaviors (Sönmez, 1986). Curriculum (teaching curriculum) has a large place within the educational curriculum. It is a guide showing the subjects to be taught in various classes and language teaching curricula in a certain teaching level, the goals to be gained, how many hours in a week a lesson to be taught according to classes, teaching methods and techniques (Büyükkaragöz, 1997).

The new understanding, trends and developments in education systems to educate individuals with requirements of the 21st century have affected all countries globally (Erginer, 2006). The basic framework of the education curriculum of the 21st century was determined by the Union of National Education, unit of education curricula (CSCENPA, 2007) as raising awareness related to the factors improving economic, social and belief systems of the society, equipping the individual with the necessary personal qualities and skills and raising individuals -equipped, willing to take responsibility, having a holistic

perspective and a worldview- in a world that is becoming increasingly global and where differences emerge (Tutkun, 2010).

2. Literature Review

2.1. Turkish Qualifications Framework (TQF)

In our era, dizzying developments in science and technology are clearly seen in the field of education just like in every fields of science. The education system, having an important place in the development of societies in all aspects and in self-realization of the individuals, is built on three foundations. These are student, teacher, and the curriculum. Ministry of Education, Turkey organizes its teaching and learning activities in accordance with both her own goals and Council of Europe, of which it is a member. Turkey Qualifications Framework (TQF) getting its source from the European Qualifications Framework (EQF) is one of these steps. Arrangements in all the educational institutions and stages of Turkey were made and have been made according to this Framework. Determination of whether the specified regulations in the Arabic language teaching curricula at different levels are made or not, if any how it is reflected in the curricula will contribute to Arabic language education studies in Turkey.

Rapid changes in the world have caused some fundamental adjustments in the dimensions and definition of skills that people of the 21st century should have. Countries realizing this have made common decisions in many areas. One of these decisions is the implementation of the "European Qualifications Framework for Lifelong Learning". This framework covers lifelong support of the activities of individuals in the field of education and training in the society and works to be done for the training of employees in need of business world. Each country has prepared its own national qualification framework in accordance with this Framework. Turkey Qualifications Framework - having a national framework that will strengthen the relationship between job and education, and will also improve the quality of education and training activities - was issued in 2015. Then Turkey updated its curriculum to reflect the Framework on education and training activities.

Qualification is "an official output obtained in case of recognition by the competent authority at the end of an assessment and validation (verification) process of the individual's acquisition of learning outcomes according to certain criteria" (Recommendation 2008/C 111/01, 2008). "It is an official document obtained when the individual is recognized by the responsible institution at the end of an evaluation and validation process in which the individual acquires the learning outcomes according to certain criteria." (URL1).

When looking at the definition of qualification in the European Qualifications Framework (EQF) and Turkey Qualifications Framework (TQF), it is an official document showing that learning outcomes are acquired at the end of the process according to specified criteria. Qualification document showing that the gains of a job have been acquired shows that the individual has the capacity to do that job.

The main purpose of the "European Qualifications Framework for Lifelong Learning", known as the European Qualifications Framework, is lifelong learning. The implementation of the idea of lifelong learning was, first time, initiated by the UNESCO in the 1970s. Lifelong learning, a better society and a better life expectancy have started to spread in many countries in a short time.

The official work of the European Union (EU) on this issue begins with the "Higher Education Memorandum in the European Community" prepared in 1973. This is followed by Open Distance Education Declaration, Green Bulletin and White Bulletin in the European Community. The studies conducted are ones directed to lifelong learning. These works are

followed by the declaration of the year 1996 as the "European Lifelong Learning Year". Lifelong learning covers all kinds of learning activities undertaken throughout life in order to develop knowledge, skills and competencies (Aksoy, 2013). The EU published a declaration (statement) of lifelong learning in 2000. The 2004 Maastricht Declaration aims at making European education and training systems a quality reference in the world up to 2010 and transforming lifelong learning into a concrete reality for all. For this purpose, forming of the European Qualifications Framework (EQF) has been accepted.

The EQF was published by the European Parliament and the Council of Europe in 2008. The 36 countries accepting this decision have established national coordination points after they committed to make their national qualifications frameworks (NQF) compatible with the EQF. Vocational Qualifications Authority (VQA, MYK acronym in Turkish) is coordinating point of Turkey. This authority represented Turkey in the counseling group of EQF. For the preparation of TQF, the NQF Preparation Commission was established in 2010. The commission consists of representatives of the Ministry of Education (MEB acronym in Turkish), Council of Higher Education (YÖK acronym in Turkish) and Vocational Qualification Authority (VQA). In March 2011, name of the framework was decided as Turkish Qualification Framework (TQF). In April 2011, the Platform for Advisory and Assessment was established to get information, opinions and contribute to the TQF activities. In September 2011 was decided to prepare the TQF Counselling Document. Thus, contributions of local and national experts will be taken. Opinions and suggestions from institutions and organizations were taken into consideration during Regulation preparation process. The draft of TQF was prepared in cooperation and submitted to the Prime Ministry of Republic of Turkey in 2014. TQF was accepted in 2015 and the FMC has been established in Turkey Qualifications Framework Department. Head of Department of TQF was established within the VQA. The graphical version of this chronology is as follows:

Table 1. *Establishment of TQF stages*
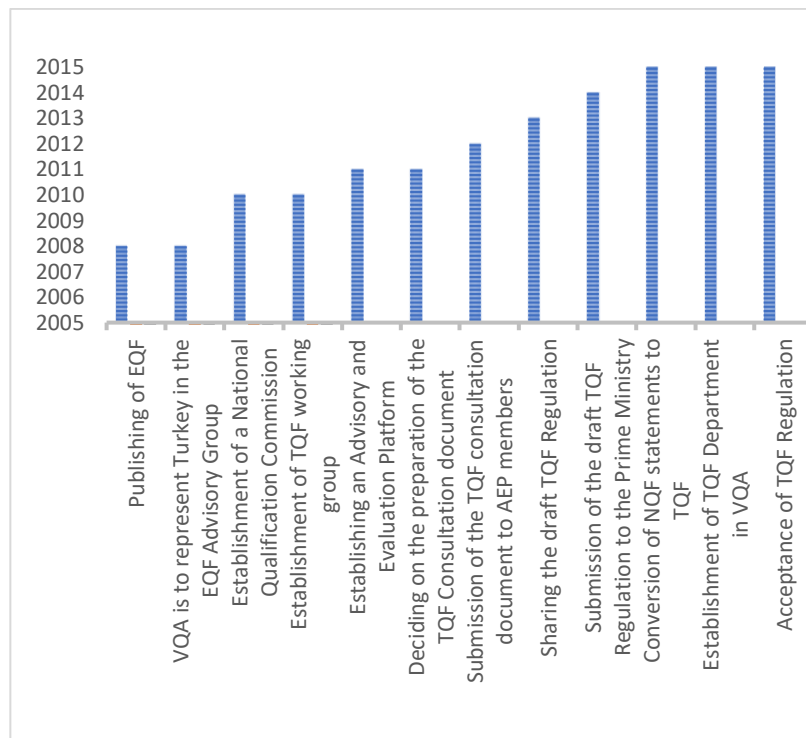
Turkey's national qualifications framework, prepared in accordance with EQF, shows all the qualification principles gained through vocational, general and academic education and training curricula -including primary, secondary and higher education- and other learning ways. TQF covers all qualifications providing quality assurance gained in all learning environments, and the various levels of education and training system in Turkey (VQA, TQF Regulation). TQF is an integrated structure defining and classifying the qualifications in Turkey and determining transition and progress relations among qualifications (TQF Regulation, 2015).

TQF has an eight level structure as in EQF. The first of these levels corresponds to pre-school education, the second to primary school, the third to secondary school, the fourth to high school, the fifth to associate degree, the sixth to bachelor degree, the seventh to master degree, and the eight doctorate education. At each level, knowledge, skill and competence learning outcomes are determined differently. Here was given descriptors of knowledge, skills, and qualifications of the 2nd, 3rd and 4th levels equaling to primary, secondary and high schools that Arabic teaching curricula are included. It is possible to reach other level identifiers in the TQF as a table:

2nd level:

Knowledge: Having factual knowledge in the field of a business or learning at beginner-level.

Skill: Having basic skills to use the necessary information in order to fulfill missions and solve possible simple problems.

Qualification: Performing simple missions with limited autonomy under supervision, being aware of learning needs within the scope of lifelong learning approach.

3rd level:

Knowledge: Having theoretical knowledge at beginner-level and factual knowledge at medium-level in the field of a business or learning.

Skill: Having the ability to select and use the necessary data, methods and tools to fulfill the mission and solve problem.

Qualification: Taking responsibility in performing missions. Completing the mission by taking into account changing circumstances. Identifying and meeting learning needs with guidance in the context of the scope of lifelong learning approach.

4th level:

Knowledge: Having theoretical and operational knowledge at medium-level and factual knowledge at over medium-level in the field of a business or learning.

Skill: Having cognitive and practical skills to perform jobs and processes specific to a business or learning area and find solutions to problems.

Qualification: Taking full responsibility for completing missions in predictable, but open to change environments. Overseeing ordinary missions carried out by others, taking limited responsibility for evaluating and improving these missions. Meeting learning needs within the scope of lifelong learning approach and determining forward learning objectives with guidance. Having awareness about knowledge, skill, attitude and behavior of the relationship between knowledge, skills, attitudes and behaviors in a business or learning area as well as ethical issues and the relationship of social problems social problems.

Theoretical knowledge specified in the descriptor is the knowledge obtained by scientific methods. It cannot be said to be valid and correct at all times. It may lose its validity as a result of scientific researches. Factual knowledge, on the other hand, is the basic elements that students must know about a subject. At the skill stage, selection of data, methods and tools-equipment needed for fulfilling their duties (missions) and solving problems and the ability to use them are pointed out. At the stage of qualification, taking responsibility, the student is expected to learn to do or learn something by herself/himself or with a group.

2.2. Key Qualifications in TQF

Key qualifications are also included in the TQF. These are the eight defined competences that each individual is expected to achieve in the context of lifelong learning. "Key Competences for Lifelong Learning - European Reference Framework" is included in the annex to the Recommendation of European Parliament and the Council of Europe on "Key Competences for Lifelong Learning" dated 18/12/2006 and numbered 2006/962 / EC.

The stated competencies are: communication in mother tongue, communication in foreign languages, mathematical competence and basic competencies in science/technology, digital competence, learning to learn, competencies related to social and civic, sense of initiative and entrepreneurship, cultural awareness and expression (TYÇ, 2015). Descriptions of these competencies exist in the TQF. MoNE (MEB in Turkish) has benefited from key competencies while re-preparing existing curricula according to TQF. Competency statements in the TQF have been further clarified by Head Council of Education and Morality (TTKB in Turkish) and presented as items. Among these competencies, "mathematical competence and basic competencies in science/technology" were also evaluated under two separate titles. These competencies are stated at the beginning of the curricula and implicitly placed in the gains (MEB, 2017):

2.2.1. Communication in mother tongue

a. Communicate effectively by using written, verbal and non-verbal communication tools.

b. Communicate in line with the requirements of the environment.

c. Expressing feelings, thoughts and opinions verbally and in writing in an appropriate and persuasive manner.

d. Using language skills positively and socially responsible / discreet.

2.2.2. Communication in foreign languages

a. To recognize and appreciate social traditions, cultural elements, and language diversity.

b. Understanding verbal and written messages.

c. In line with their needs, reading texts, understanding what they read and producing texts.

d. Learning the informal language (daily spoken language) as part of lifelong learning.

e. Respect cultural diversity.

f. Curiosity and interest in language learning and international communication.

2.2.3. Qualification (proficiency) in mathematical competence and basic competences in science and technology

a. Knowing mathematical theories, measurements, basic operations, formulas, and notations.

b. Understanding and using math concepts and terms.

c. Using mathematical thinking style (logical and spatial thinking) and presentation (formulas, models, structures, graphics, tables) in solving problems encountered in daily life situations.

d. Applying basic mathematical principles and operations to daily situations (at home and / or at work).

e. Developing a positive attitude towards mathematics.

f. Asking questions and deduction conclusions based on evidence to understand natural life.

g. Understanding the changes caused by human actions.

h. Comprehending responsibilities individually towards natural life.

i. Knowing the basic principles, basic scientific concepts, methods, technology, technological products and processes related to natural life.

j. Understanding the effect of science and technology on natural life.

k. Comprehending the properties of scientific inquiry.

l. Establishing cause and effect relationship.

m. Having knowledge about ethical and security issues.

2.2.4. Digital Qualification

a. Understanding the structure of information age technologies, their role in daily life situations (individual, in social and business life) and the opportunities it provides.

b. Apprehending basic computer applications (word processor, databases, knowledge storage and management, etc.).

c. Comprehending the opportunities and potential risks of the Internet and electronic media (e-mail, Internet tools) for work, leisure, knowledge share, learning and research.

d. Questioning the reliability of the available knowledge and information sources.

e. Understanding the legal and ethical principles that should be considered in the use of interactive media and using them responsibly.

f. Researching, collecting, processing, and using knowledge critically and systematically.

g. Questioning the reliability of the knowledge provided.

h. Using the tools neeed to produce, present and comprehend knowledge.

i. Accessing, researching and using Internet-based services.

j. Using knowledge age technologies for cultural, social and / or professional purposes.

2.2.5. Learning to learn

a. Knowing the necessary qualifications competencies, knowledge, skills and qualities for business or career goals.

b. Knowing their own learning strategies, strengths and weaknesses.

c. Searching training, in-service training, guidance and consultancy opportunities.

d. Acquiring and developing literacy, mathematical skills and information communication technologies needed for further learning.

e. Managing learning and career.

f. Acquiring self-discipline and independent working skills.

g. As part of the learning process, cooperative work, benefiting from heterogeneous groups, sharing what they learn.

h. Assessing his/her own learning and work.

i. Getting advice and information when needed.

j. Motivating and trusting yourself.

k. Developing problem solving skills.

l. Coping with obstacles or changes.

m. Benefiting from previous learning and experience.

n. Applying what they have learned to various life situations.

o. Searching and evaluating learning opportunities.

2.2.6. Sense of initiative and entrepreneurship

a. Realizing opportunities in personal, professional and/or business life.

b. Adopting ethical values.

c. Making effective presentations.

d. Being compromising.

e. Working individually and as a group.

f. Recognizing your own strengths and weaknesses and questioning/evaluating.

g. Taking risks when necessary.

h. Making a situation assessment.

i. Taking initiative in personal, social and business life and innovative thinking.

j. Being intent on reaching the goals or personal goals.

2.2.7. Social and public qualifications

a. Knowing rules of conduct accepted in different societies and environments (eg work).

b. Knowing basic concepts about society and culture.

c. Being aware of and respecting cultural diversity.

d. Assimilation of national cultural identity and understanding how to interact with other cultures. Allowing for tolerance, empathizing with, solidarity, collaboration.

e. Avoiding stress and conflicts.

f. Respecting different perspectives, overcoming prejudices and taking a compromising attitude.

g. Having knowledge about democracy, justice, equality, citizenship, human rights, local/national/international organizations. Following-up current developments.

2.2.8. Cultural awareness and expression

a. Being aware of local, national and international cultural heritage.

b. Having knowledge about important cultural studies and popular culture.

c. Being aware of cultural and linguistic diversity.

d. Understanding the importance of aesthetic factors in life.

e. Valuing and appreciating artworks and art studies.

f. Participating in cultural life.

The reason for giving publicity to qualification descriptors here is intended to clearly show what is being searched in Arabic teaching curricula. All key qualifications are interrelated. Each focuses on critical thinking, creativity, initiative, problem solving, risk assessment, decision making, and constructive management of emotions (TYÇ, 2015). Acquisition of key competencies in Turkey's education policy has a priority. That's why it is essential that key competencies are included in the learning outcomes of education and training curricula. In the process of forming the curricula according to TQF, by taking into consideration the level language teaching curricula, curricula in accordance with those level descriptors have been prepared by the relevant general directorate.

In the subject of reflection of Turkey Qualifications Framework on teaching curricula concerning Arabic language teaching curricula, following key words "Qualification, Turkey Qualifications Framework, European Qualifications Framework, Arabic Language Teaching Curriculum" were scanned in TR Index, Council of Higher Education (abbreviation YÖK in Turkish) National Thesis Centre, Dergi Park, National Library and the Library of the Council of Higher Education on 20 May, 2020. It was observed that the studies focused on the qualifications in higher education, but there was no study examining the compatibility of curriculum with TQF. A research in this direction will contribute to the development of Arabic language curricula.

This study aims at determination of reflections of Turkish Qualifications Framework (TQF) on Arabic language teaching curricula developed and approved for different levels in the years of 2016 and 2018. Turkey -being in the harmonization process with the EU- plans its educational activities to be appropriate to the European Qualifications Framework released through the recommendation of the Council of Europe and the European Parliament. In this regard, Turkey has to prepare teaching curricula in accordance with the recommendations. The suitability of Arabic language teaching curricula to EQF, thus TQF, is important as an evidence of the status and progress of Turkey in the light of future EU harmonization.

The research question of the study is "Does the quality of the Arabic Language Teaching Curricula in Turkey coincide with the principles of the Turkish Qualifications Framework?"

3. Method of the Study

In this qualitative research, the Document Review Method was utilized. Qualitative research is expressed as a research in which data is collected through such data collection tools as observation sheets, interviews, questionnaires, related review of literature or document review. All the data collected are presented in a holistic way (Creswell, 2016; Yıldırım & Şimşek, 2013). The document review involves the gradual analysis of the facts or materials based on the facts that are aimed to be investigated (Yıldırım & Şimşek, 2013).

3.1. The Documents Reviewed

In the research, besides the Turkish Qualifications Framework, the current Arabic language teaching curricula approved by the Ministry of Education (MoNE) Board of Education (TTKB acronym in Turkish) were referred as the main study documents:

a. Primary school Arabic Language Teaching Curriculum (Grades 2-8) (MoNE, 2016)

b. Arabic Language Teaching Curriculum for 9th and 10th Grades of Anatolian Religious High Schools (MoNE, 2016)

c. Business Arabic Language Teaching Curriculum for 11th and 12th Grades (MoNE, 2018)

d. Arabic Language Text & Speaking Teaching Curriculum for 11th and 12th Grades (MoNE, 2014)

3.2. Analysis of the Data

Research investigation documents were analyzed via content analysis method based on the pre-determined criteria. The main purpose in content analysis is to reach concepts to be explained the collected data and the relationships (Yıldırım& Şimşek, 2013, p. 259). Criteria were 2nd, 3rd, and 4th level descriptors in Turkey Qualifications Framework and eight key competences as given above.

4. Findings and Discussion

The findings of the study can be stated as follows:

The Ministry of National Education (MoNE) has four general directorates of whichthe Board of Education approves and publishes the curricula. They are ; a) General Directorate for Special Education and Guidance, b) General Directorate for Primary Education, c) General Directorate for Secondary Education, and d) General Directorate for Vocational and Technical Education (http://mufredat.meb.gov.tr)

Curricula are not yet installed (uploaded) on the General Directorate for Special Education and Guidance Services. There are 50 teaching curricula on the website of General Directorate of Primary Education. 10 of these are curricula of elective language teaching curricula. The remaining teaching curricula belong to compulsory language teaching curricula. Of these 50 curricula, as a language curriculum, Chinese is elective, Turkish and English are compulsory language teaching curricula.

There are 44 language teaching curricula belonging to the General Directorate of Secondary Education. All of them are compulsory and include German, French and English language teaching curricula. A total of 101 language teaching curricula are included in the General Directorate of Vocational and Technical Education. All of them are compulsory and there are no language teaching curricula. General directorates and lesson curricula are given in the following table:

Table 2. *Distribution of education curricula by general directorates*

General Directorate	Number of Language teaching curricula	Number of Compulsory Language teaching curricula	Number of Elective Language teaching curricula	Number of Language and Literature Language teaching curricula
Special Education and Guidance	-----	----	----	----
Primary	50	40	10	3 (Chinese elective)
Secondary	44	44	----	3
Vocational and Technical Education	101	101	----	----

Curricula prepared by the relevant General Directorates are inspected by MoNE Head Council of Education and Morality (TTKB acronym in Turkish) and published at following link (http://mufredat.meb.gov.tr/Curriculumlar.aspx).

When General Directorates that Ministry of National Education HCEM inspects and publishes their curricula are checked, it is seen that the General Directorate of Religious Education -in which Arabic curricula are prepared- is not taken place. That teaching curricula of Arabic -which is taught as a lesson in institutions affiliated to MoNE- is not included here creates suspicion that HCEM is not active enough during the inspection and publishing stages.

The following Arabic language teaching curriculacurricula prepared by the General Directorate of Religious Education of Ministry of National Education are either elective or compulsory:

Table 3. *Situation of Arabic curriculum for primary education (2-8ᵗʰ Grades) (MEB, 2016):*

Level	Compulsory	Elective
Primary		x
Secondary		x
Imam Hatip (Islamic Divinity) Secondary School	x	

Arabic Education Curriculum for Anatolian Imam Hatip High Schools 9th and 10th Grades (MEB, 2016), Business (Professional) Arabic Curriculum for 11th and 12th Grades (MEB, 2018), Arabic Text-Dialogue (Dual Speaking) Teaching Curriculum for 11th and 12th Grades (MEB, 2014) curricula are also prepared.

Table 4. *Status of Arabic lesson in secondary education grades*

Level	Compulsory	Elective
Anatolian Imam Hatip High School		
Arabic language teaching curricula for 9th and 10th Grades	x	
Professional Arabic for 11th and 12th Grades	x	
Arabic Text Dialogue 11th and 12th Grades		x
Foreign Language Arabic Language teaching curricula (9, 10, 11 and 12th Grades)		x

4.1. Language and Literature Teaching Curricula of MoNE

There are Chinese, English, Turkish language teaching curricula within the General Directorate of Primary Education. Teaching curricula of English, French, German and Turkish Language and Literature language teaching curricula exist in the curricula within the General Directorate of Secondary Education.

Curricula for language teaching curricula within the General Directorate of Vocational and Technical Education are included in web page of General Directorate, not on the HCEM page. Therefore, teaching curricula for language, literature and foreign language teaching curricula can be accessed to following link: (http://www.megep.meb.gov.tr/).

Within the General Directorate of Religious Education, there are curricula for Primary and Secondary Schools, Imam Hatip Secondary Schools and Anatolian Imam Hatip High Schools. In addition to the Arabic language teaching curricula mentioned above, Turkish, foreign language and Turkish Language and Literature teaching curricula are taught in the schools affiliated to this General Directorate. The curricula of these language teaching curricula are the same as the curricula in other general directorates.

4.2. TQF in Language and Literature Teaching Curricula

One of the effects of globalization is that the subject of foreign language teaching in our country is becoming more and more conscious. In this way, foreign language teaching programs are conducted like mother tongue programs, especially from the first years of the child's formal education life. In this context, like all foreign language teaching programs in our country, the Arabic education program has been arranged to start from the second grade of primary school. However, these programs have brought some problems with them besides their applicability (Polat, 2019a: 179). Throughout history, as in other branches of science in our country and in the world, first a book was written and the program was arranged according to the book. However, over time, the opposite started to be done, first the program was made, and then the textbooks suitable for the program began to be written(Polat, 2019b: 940).

In line with the strategy "Teaching curricula will be developed on the basis of knowledge, skills and competencies defined in the 2nd, 3rd and 4th levels of Turkey Qualifications Framework" be included in the 2014-2019 Strategic Plan of the Ministry of National Education, updating of the curricula have been carried out since 2017.

Generally, when looking at the curriculum, TQF is specified under the title of "Competencies" at the beginning of the curricula and implicitly placed on the achievements. For example; Looking at the Turkish teaching curriculum, the TQF is mentioned in the "competencies" section as follows:

"Our education system aims at raising individuals with the knowledge, skills and behaviors integrated in competencies. At both national and international levels, competencies with a range of skills that students will need in their personal, social, academic and business life were determined in Turkey Qualifications Framework (TQF). TQF determines eight key competencies and identifies them as follows."

It is stated that the curriculum is prepared in accordance with Turkey Qualification Framework (TQF) with following expression among the objectives of the curriculum in the curriculum of Chinese language teaching curricula (for Secondary and Imam Hatip Secondary School 5th, 6th, 7th, 8th Grades-2018) prepared by the General Directorate of Primary Education:

"Students who have completed secondary school have adopted national and moral values by developing their competencies in primary school; To ensure that students are individuals who have acquired basic skills and competencies in TQF as well as in discipline-specific fields." (http://mufredat.meb.gov.tr/Curriculum, page 3). Again, under the "Competences" heading of the curriculum, eight key competences mentioned in Turkey Qualifications Framework (TQF) have been addressed.

Under the heading "Basic Qualifications in the Curriculum" in the English language teaching curricula teaching curriculum (Grades 2-8), TQF is mentioned as follows (p.5);

3.2.1. Traditional Skills:

- Communication in mother tongue

- Communication in foreign language

3.2.2. Digital Skills

- Literacy, basic skills in mathematics and science

3.2.3. Horizontal Skills:

- Learning to learn

- Social and civic responsibility

- Initiative and entrepreneurship

- Cultural awareness and creativity

Under the title of "qualifications and skills" in the curriculum of French language teaching curricula, it is said that: "The French Language teaching curricula Curriculum includes the gains enabling students to use their high-level cognitive skills (make an inference, comment, analyze, evaluate, critical thinking, creative thinking, etc.) while acquiring and developing language skills. Development of qualifications of sociocultural awareness and media literacy competencies as well as language skills are among the objectives of the curriculum." (http://mufredat.meb.gov.tr/CurriculumDetay).

Again, under the title of "Socio-cultural Awareness" of the curriculum: "Learning a foreign language and acquiring linguistic and cultural qualification in a foreign language do not mean that students forget or lose their own language and culture. While students are encouraged to adopt and use their language and cultural identity correctly, they should be motivated to raise awareness of cultural elements of different countries, respect the differences, thus, be active participants in a multicultural and multilingual world (p. 8).

In the "Introduction" section of the French Curriculum; "Common European Application Text (Framework of Reference) for Languages, which sets comparable standards for foreign

language learning and teaching was used in the preparation of the curriculum. This resource is a comprehensive, transparent and consistent guide prepared to lead French teachers and language learners in the field of language learning, teaching and assessment. In this guide, importance of lifelong learning, learner autonomy and intercultural interaction are emphasized; the target, knowledge and skills expected to be gained in the language learner are defined by their language proficiency levels." (p. 4).

No information was found on the use of TQF in the German curriculum (teaching curriculum) within the language curricula. Although it was published in 2018, the fact that the German curriculum is not revised according to TQF is a major deficiency.

In the "Introduction" section of the Secondary Education Turkish Language and Literature Language teaching curricula (9, 10, 11 and 12th Grades - 2018) Curriculum, the key competencies of the TQF are mentioned under the title "Competencies" as follows: "Our education system aims at raising individuals with the knowledge, skills and behaviors integrated in competencies. At both national and international levels, competencies with a range of skills that students will need in their personal, social, academic and business life were determined in Turkey Qualifications Framework (TQF). TQF determines eight key competencies and identifies them as follows."

4.3. TQF in Curricula Other Than Language and Literature

When curriculum of the Social Studies Language teaching curricula (Primary and Secondary education 4th, 5th, 6th, and 7th Grades) is examined, by mentioning TQF in the "Introduction" section under "Competences" title of the curriculum, it is emphasized that the curriculum is prepared according to eight key competencies of TQF.

"As a result of the analysis of the key competencies in TQF in terms of skills and values, key competences have been found to be a combination of skills and values as described in the European Commission's document titled "Key Competences For Lifelong Learning, European Reference Framework" (EC, 2007, p. 3).

In the competences section of Science language teaching curricula, in Physical Education (Gym) Language teaching curricula and in many curricula, TQF is mentioned under the title of "competencies".

4.4. TQF in Arabic Language Teaching Curricula

Examining the structure of Arabic teaching curricula; it is seen that there is a structure in the form of the purpose, scope, learning areas, gains, explanations, language structures of the curriculum. When this structure is analyzed, it is understood that TQF is not given indirect or direct place. Whereas, TQF is absolutely mentioned somewhere in the curriculum and it is emphasized that the curriculum is prepared according to this when looking at the curricula of other language curricula and language teaching curricula other than language.

When the Arabic language teaching curricula are examined, it is seen that they are not prepared in line with the level descriptors found in the Turkey Qualification Framework. Considering the data obtained from the examination of eight key competencies in Turkey Qualification Framework, it is seen that the listening/watching, speaking, reading and writing achievements of the Arabic curriculum do not comply with key competences such as "communication in the mother tongue, communication in foreign languages, mathematical competence and basic competences in science/technology, digital competence, learning to learn, competences of social and citizenship, taking initiative and entrepreneurship, cultural awareness and expression".

From the point of view of knowledge, skill and competence in TQF, the status of Arabic curricula by classes is as in the table below:

Table 5. *Primary education*

Grades	2	3	4	5	6	7	8
Knowledge	-	-	-	-	-	-	-
Skill	-	-	-	-	-	-	-
Competence	-	-	-	-	-	-	-

Table 6. *Secondary education (Anatolian Imam Hatip (Religious) High School)*

Grades	9	10	11	12
Knowledge	-	-	-	-
Skill	-	-	-	-
Competence	-	-	-	-

Although some of the gains in the curricula seemed coincidental to TQF, when listening/watching, speaking, reading and writing gains are examined, it is understood that the gains are not prepared in accordance with level descriptors in the Turkey Qualifications Framework "knowledge, skills, competences". For example, gain in the form "Connects words with simple conjunctions." in Grade 5 Theme 5 corresponds to skill competence in TQF. Again, gain in the form "Finds the main idea of a simple and short text / dialogue s/he read." In Grade 7, Theme 4 corresponds to "competence" stage in TQF. While the gains related to speaking are given in the achievements of 10th Grade 1st Theme, "S/he makes sentences with relevant expressions about the subject." is compatible with the key competence of communication in foreign languages. Again, in 10th Grade 6th Theme, gain "Writes e-mail." seems to be compatible with "Digital Competence", one of the key competences of TQF. Again, in 2nd Grade 1st Theme, gain "Makes a visual presentation about the expressions of the theme" seems to be compatible with the key competence of TQF "Mathematical Competence and Basic Competences in Science/Technology".

Arabic curriculum in terms of key competencies in TQF is shown in Table 7 and 8.

Table 7. *Status of Arabic language teaching curricula in terms of key competencies at primary education level*

Communication in Mother Tongue	2	3	4	5	6	7	8
Communication in Foreign Languages	-	-	-	-	-	-	-
Mathematical Competence and Basic Competences in Science/Technology	-	-	-	-	-	-	-
Digital Competence	-	-	-	-	-	-	-
Learning to learn	-	-	-	-	-	-	-
Competences concerning social and citizenship	-	-	-	-	-	-	-
Taking Initiative and Entrepreneurship	-	-	-	-	-	-	-
Cultural Awareness and Expression	-	-	-	-	-	-	-

Table 8. *Status of Arabic language teaching curricula in terms of key competencies at secondary education level (Anatolian Imam Hatip (Religious) High Schools)*

	9	10	11	12
Communication in Mother Tongue				
Communication in Foreign Language	-	-	-	-
Mathematical Competence and Basic Competences in Science/Technology	-	-	-	-
Digital Competence	-	-	-	-
Learning to learn	-	-	-	-
Competences concerning social and citizenship	-	-	-	-
Taking Initiative and Entrepreneurship	-	-	-	-
Cultural Awareness and Expression	-	-	-	-

5. Conclusion

Not including of the General Directorate of Religious Education, in which Arabic curricula are prepared among the general directorates supervised by the HCEM (TTKB acronym in Turkish) of Ministry of National Education-publishes its curricula, and not including of the curriculum of Arabic, which is taught as a lesson in institutions affiliated to MoNE creates suspicion that HCEM is not active enough during the auditing and publishing stages. When the curricula of other language teaching curricula are analyzed, In these curricula, it is seen that TQF is explicitly stated under the title of "Competencies" or implicitly in the content of the curriculum.The fact that TQF, which measures and registers the competence of individuals both nationally and internationally, is not included in Arabic curricula in any way is seen as a major deficiency in terms of the success of this language teaching curricula and the training and success of the students taking the language teaching curricula.

Preparation of Arabic language teaching curricula teaching curriculum (curriculum) by the General Directorate of Religious Education is also another problem because Arabic is a foreign language such as German, French and English. In this respect, Arabic language teaching curricula curriculum should be prepared by the MoNE and included in the General Directorate of Secondary Education and the curricula should be created in accordance with the TQF. The fact that Arabic is different from other religious language teaching curricula within the General Directorate of Religious Education is that it should be a foreign language. From this point of, it should include the same category and other applications and activities as other foreign languages.

It may be suggested to include Arabic language teaching curriculum in the education system of MoNE General Directorate of Secondary Education should be supervised by the Board of Education as a foreign language. On the other hand, Arabic language teaching curricula should be revised and prepared according to TQF principles, and necessary activities and competencies should be included. In this way, Arabic language will better be perceived as a foreign language like the other foreign languages in the education system of the MoNE.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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AN INVESTIGATION OF THE SONGS CREATED BY STUDENT-TEACHERS IN MUSIC VIA AN INTERDISCIPLINARY APPROACH BASED ON THE RASCH MEASUREMENT MODEL AND THE MAXQDA ANALYSIS PROGRAM

Research article

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AN INVESTIGATION OF THE SONGS CREATED BY STUDENT-TEACHERS IN MUSIC VIA AN INTERDISCIPLINARY APPROACH BASED ON THE RASCH MEASUREMENT MODEL AND THE MAXQDA ANALYSIS PROGRAM

Abstract

The study aimed to investigate the songs created by the student teachers in music in the focus of special education through an interdisciplinary approach based on the Rash measurement model and the Maxqda analysis program. This case study adopted the mixed research design. The participants consisted of 12 student teachers in music and 10 jury members in 2018-2019 academic year. In the quantitative analysis of the study, 10 expert jury members in the field of Music Education evaluated 12 songs using an evaluation form consisting of 8 items via the Rasch measurement model, and in the qualitative context, the views of the jury members on the songs were examined through the Maxqda analysis program. The jury members were selected in accordance with the maximum diversity sampling model on voluntary basis. All the songs focused on the achievements in the special education course. The results revealed that the most difficult item was the 'musical creativity level', whereas the easiest item was 'the degree of suitability for purpose in the creation of lyrics'. In the study, it was recommended that field courses and didactic courses should be integrated in the field of music education.

Keywords: Student teachers in music, special education, interdisciplinary approach, teacher education, Rasch measurement model, Maxqda analysis program

1. Introduction

The world has evolved and changed at the center of education and training activities in the 21st century. Achieving knowledge and developing new skills to meet different educational or market needs have become significant. It is emphasized that educational programs should be able to develop high-level thinking skills that can serve the needs of individuals and evaluate and solve the problems faced in real life. In this context, the knowledge and skills of teachers also have an important place in the education process of individuals. Defining teacher skills and knowledge that guide the professional development of teachers seem to be very important in terms of revealing learning activities with clear and understandable goals (Organization for Economic Co-operation and Development [OECD], 2005). In this context, teacher competencies, which determine the professional qualifications and effectiveness of teachers, are defined as the knowledge, skills and attitudes that teachers should have in order to perform their profession effectively and efficiently (The Ministry of National Education [MEB], 2017). The teaching profession, which has been updated by the Ministry of National Education (2017), consists of three main competence areas associated with each other and 11 competencies under them. These are professional knowledge (field knowledge, field education knowledge, legislative knowledge), professional skills (education planning , creating learning environments, managing the teaching and learning process, measuring and evaluating), attitudes and values (national-spiritual and universal values, student approaches, communication and collaboration, personal and professional development),which are included in the general qualification guide for the teaching profession.

The qualifications and competencies that teachers should have are very important in every teaching level as well as in every field or discipline. In this context, the basic structure of teacher education programs is very significant in terms of training qualified teachers. A qualified teacher education will enable student teachers to have the competencies determined in the field of teaching and to organize qualified teaching-learning processes in the education process. Regarding this situation, the Council of Higher Education updated 25 teacher education undergraduate programs and included the Special Education and Inclusion as a didactic course in the Music Education undergraduate program in the undergraduate programs which it deals with as part of the "New Teacher Training Undergraduate Programs". In addition, it includes didactic knowledge elective courses such as Individuals and Adaptation of Learning Disability and Teaching (Council of Higher Education, 2018). Thus, in addition to the field education courses of student teachers in music, the didactic knowledge courses taken by them contribute to the general proficiency of the teaching profession they should have.

Didactic knowledge elective courses, which emphasize the importance of the concept of individualizing teaching in coordination with the achievements of the special education and inclusion course in music teacher undergraduate programs and support the skills of individuals with learning disabilities in educational environments, are important in terms of ensuring student teachers to have different perspectives based on an interdisciplinary approach. This would help teachers carry out their education with an interdisciplinary approach, not based on a single discipline, in the focus of the program philosophy that focuses on the interests and needs of learners.

Today, interdisciplinary teaching approach is of great importance as a consequence of changing needs in the field of education. The interdisciplinary teaching approach is defined in different ways by researchers and, therefore, gains a new meaning. A subject, concept or problem determined through the interdisciplinary approach is evaluated and analyzed from the perspective of different disciplines, and it is integrated into a whole again. According to Jacops (1989), interdisciplinary education is the approach that reconsiders the subject, event, problem, application or experience taken to the center with more than one discipline perspective. According to Yıldırım (1996), interdisciplinary education is the evaluation of a particular concept, problem or subject by using different knowledge and skill areas on the basis of different perspectives. Aydın and Balim (2005), on the other hand, defined this concept as the integration of the problem or issue with relevant fields and skills that could shed light on different aspects of this concept. Perkins (1994) expressed the interdisciplinary approach as a wealth of information from different disciplines, where the correct answer is sought without adhering to a single discipline. In summary, the interdisciplinary approach refers to the relationship between two or more disciplines, to combine at least two disciplines and to integrate and present disciplines as a meaningful whole around certain basic concepts (Apostel, 1970; Kline, 1995). The interdisciplinary approach is not to transfer information from a discipline to another discipline. The essence and main purpose of this approach is to learn the subject as a meaningful whole and to create opportunities to be considered from the perspectives of other disciplines (Yalçın & Yıldırım, 1998). In this context, the teaching process in an interdisciplinary structure makes an important contribution to teaching and combining the meaningful knowledge and skills of certain disciplines since an interdisciplinary teaching approach makes it easier to articulate an event from the focus of different disciplines, to understand the event and to identify solutions to problems. In this context, the association of the knowledge of student teachers in music with special needs in the music field will contribute to their professional development and knowledge.

The developments and changes in the 21st century change the structure of the education and training processes and require a different perspective. A more focused approach to individual

characteristics has become widespread in the field of music education, as in other educational fields. Individuals have some needs because of their developmental characteristics. Individuals with different developmental characteristics and needs according to their peers are called individuals with special needs who need special education. Individuals in need of special education are individuals who differ significantly from their peers in terms of their individual characteristics and educational qualifications (The Ministry of National Education [MEB], Special Education Services Regulation, 2018). It will be possible for teachers to reach their students, who need special education in the classroom, and to contribute to them only by becoming aware of their characteristic structures. Within the scope of the special education and inclusion course included in teacher training programs, it is ensured that student teachers in music learn the basic principles of special education, know the causes of disability, recognize the importance of early diagnosis and treatment, and have information about individuals with various disability types. The fact that student teachers become familiar with the social, emotional and behavioural characteristics of their students with special needs when they start the teaching profession will help them offer a qualified education to those children with mental, auditory, visual, and physical disabilities, with language and communication disorders, with attention deficit and hyperactivity disorder, and with special learning disabilities, autism and giftedness. In this context, the qualifications that a music teacher should possess are the competencies to create awareness in reaching individuals with special needs as well as individual features and competencies required for music and music education, and to make adaptations in the curriculum in teaching with integrated activities for students in the classroom (Akbulut, 2006).

The contribution of music teachers is undeniably important in music education to be given to individuals who need special education (Tufan & Güdek, 2008) since music is the most basic way of communication to reach students with special needs. It is stated in the literature that music has an effect that improves the body, opens the mind and activates the creative spirit (Campbell, 2000; Hallam, 2010). There are examples that show that music can be more successful in a child with a special need than the balance achieved by psychologists and psychiatrists (Campbell, 2002). This effect is not only limited to emotional development; it is also seen that students who are interested in music have made progress towards being more successful mentally.

Music education is the process of helping individuals acquire certain musical behaviors through their lives, creating desired changes in musical behaviors, or developing and creating individuals' musical behaviors for their own purposes (Uçan, 1994). When pedagogically examined, music education has an important role in different developmental areas of individuals including cognitive, affective, psychomotor, social and language development. In this fine line, where the use of music shifts from education to rehabilitation, music can be used as an activity that brings success to the lives of individuals with special needs. Music education has a special importance and place in the developmental periods of individuals with special needs since music education is a field that emotionally and physically stimulates individuals. Music also enables individuals to express themselves. Music education for individuals with special needs contributes greatly to their development by affecting their lives positively, increasing their self-confidence. Emphasis has also been placed on the positive contribution of musical studies to individuals' communication skills in special education, and the effectiveness of music education in terms of helping individuals with special needs gain basic skills, such as developing good behavior, having positive self-perception and establishing eye contact, has been stated (Meadows, 1997). According to Turan (2006), music enables children with special needs to develop spiritually, physically and academically, while ensuring that children trust themselves and enjoy success. In addition, art and music education is effective in providing

attitudes and behavior to individuals with special needs (Güler, 2008). Music is used as an educational tool with musical activities in the field of special education (Güven & Tufan, 2010; Yıldırım & Albuz, 2010) and the importance of music is increasing day by day in the education of children with special needs (Uslu, 2007). Music activities increase attention skills, hand-arm coordination skills, auditory perceptions and language skills of children with special needs. In addition, such activities contribute to the development of verbal and non-verbal communication skills of children with special needs (Havlat, 2006; Stephenson, 2006). When the studies in the literature are examined, there are also important studies which reveal that music has a positive effect on the development of social skills (Akıncı & Alpagut, 2017) and also contributes to children's development in learning (Brown, Benedett, and Armistead, 2010; Brown and Sax, 2013; Bugos and DeMarie, 2017; Moreno Marques, Santos, Santos, Castro & Besson, 2007; Williams, Barrett, Welch, Abad and Broughton, 2015).

More specific studies on the use of music and music education in the field of special education are also reported in the literature. Although it is seen that, among these studies, studies dealing with the relationship between autism spectrum disorder and music are more, there are also studies investigating the effect of music education with children who need different types of special education.

Berrakçay (2008) examined the effect of music in the regulation of social behavior of children with autism spectrum disorders and in reducing negative behaviors. Yılmaz (2010) investigated the non-verbal communication signs that emerged within the framework of the music workshop for students with autism spectrum disorders. While Güven and Çevik (2011) studied music education in children with autism spectrum disorders, Eren, Deniz and Düzkantar (2013) examined the effectiveness of music activities prepared according to the Orff approach in teaching concepts to autistic children. Baker, Wigram and Gold (2005) analyzed the effect of music on the treatment and evaluation of autistic spectrum disorder, whereas Lawes (2012) examined the use of music therapy in autism. Warnock (2012) investigated that multiple learning problems, complex needs, and children with autism could only be trained using melodies without lyrics during music therapy and Boso, D'Angelo and Barale (2013) examined the relationship between music ability and neuropsychological in autism spectrum disorder. Artan (2001) examined that music was an effective technique in the education of children with special needs, whereas Savarimuthu and Bunnell (2002) focused on the effect of music on patients with learning disabilities. Turan (2006) investigated the opinions of teachers about the problems encountered in using music in special education and Öner (2006) examined the sensitivity of children with learning disabilities to music. Çadır (2008) examined whether social skill teaching programs prepared according to the music therapy method were effective in learning the social skills of children with mental disabilities. Cakir-Dogan (2011) analyzed the state of music education for students with intellectual disabilities at primary level in Turkey. Ceylan (2012) focused on the effects of music education on the developmental characteristics of preschool children with a hearing disability, while Eren (2012) examined the inclusion practices in music education and the use of Orff Schulwerk. Malkoç and Ceylan (2013) analysed the effects of music education on the developmental characteristics of preschool children with a hearing disability, whereas Çay and Özbey (2016) examined the effectiveness of teaching with the skill of developing rhythm with guitar to students with mental disabilities.

When the literature is examined, there are many studies focusing on the effects of music on students with disabilities and examining the effects of music on individuals with special needs in the context of different variables. However, there are not any studies which focus on whether music teachers or student teachers in music can integrate their field knowledge achievement with professional knowledge, produce original products and gain experience, or transfer the knowledge acquired in the field to didactic knowledge courses. Within the scope of the special

education and inclusion course in education faculties, no studies or practices are carried out on how student teachers will combine the professional knowledge of the special education field with their own field knowledge. Before starting the teaching profession, student teachers in music cannot gain experience about what they can do in the focus of their basic behavioral and learning features as well as about how to transfer their knowledge of the field to their didactic knowledge, the most important of which is the behavioral and learning features of the student with special needs that might be found in their class.

In short, although there are many studies focusing on the effects of music on students with disabilities, such a research is needed since there is no research for music teachers or student teachers to transfer the knowledge acquired in field courses to the special education didactic course and to produce original songs in this process. The songs, which are discussed in the focus of various achievements in music education, are an important tool of music education (Akıncı, 2019).

The purpose of this research was to examine the songs created by student teachers in music in the focus of special education achievements through an interdisciplinary approach. In this context, via the Rasch Measurement Model and the Maxqda analysis program, it was aimed to reach more general results in a comprehensive manner. Consequently, the study aimed to find out the answer to the research questions;

1. What are the opinions of student teachers regarding the strictness/generosity and item difficulty analysis of the evaluators in the focus of special education achievements?

2. What are the jury opinions about the songs composed by student teachers by focusing on special education achievements with an interdisciplinary teaching approach?

3. What is the conceptual structure of the songs composed by student teachers by focusing on special education achievements with an interdisciplinary teaching approach?

2. Methodology

2.1. Research Model

This case study adopted mixed research design based on both qualitative and quantitative data. In the literature, it is stated that by combining quantitative and qualitative researches, each approach can maximize its power and develop complementary insights (Creswell and Plano Clark, 2011; Hanson, Creswell, Clark, Petska and Creswell, 2005). In this study, it was attempted to perform an in-depth analysis of the research problem by quoting quantitative values in the quantitative context and the subjective interpretations of the participants in the qualitative context.

In the study, the Rasch measurement model was used to analyze the songs created by student teachers in music in the focus of special educational achievements. The Rasch model is defined as a model that explains the correctness of an answer to confirm an item on a linear scale with the relative distance between an item and the participant position (Wright and Linacre, 1994). In other words, answers given by participants to any item is a research process that is evaluated by squaring the scores of the items evaluated on the same plane with the difficulty/convenience level of the items in the assessment (Batdı, 2016; Batdı, 2017). The Rasch measurement model explains how a person's performance based on a particular feature predicts that person's response correctly or incorrectly (Tennant & Conaghan, 2007). The Rasch measurement model contributes significantly to obtaining valuable data for the development, modification and monitoring of a valid measurement (Boone and Scantlebury, 2006; Tennant, & Conaghan, 2007).

In the qualitative part of the research, the perspectives of the jury members towards the songs created by the student teachers in music through an interdisciplinary teaching approach with the focus of special education achievements were analyzed in accordance with the case study design with the Maxqda software. A case study is an approach that relies on solid evidence and requires in-depth research, and deeply examines and analysis the structure among factors that affect the current situation or the development process (Best & Kahn, 2017; Yıldırım & Şimşek, 2013). A case study provides an in-depth investigation of the situation in which a limited system or several situations are depicted and analyzed (Merriam, 2013). In addition, it deals with factors related to a situation with a holistic approach (Stake, 2005; Yin, 2003).

Conducting the research within the scope of the special education course of the student teachers in music, and creating 12 songs from the subject achievements in 14 units within the scope of the special education course are among the limitations of the study.

2.2. Participants

The study group consisted of 12 student teachers who took the "Special Education" course in the Department of Music Education of the Faculty of Education in a state university in Tukey in the 2018-2019 academic year. In the study, the songs created by 12 student teachers in music were evaluated via the Rasch analysis method by 10 expert jury members in the field of Music Education selected in accordance with the maximum diversity sampling model. In cases where appropriate samples are selected (Singh, 2007; Linacre, 1993) with a wide range and distinct features related to the subject being researched and where the specific and very different features of these situations are described (Palinkas, Horwitz, Green, Wisdom, Duan, & Hoagwood, 2015), the maximum diversity sampling method is used. In the research, the jury members were determined according to various qualifications as specialists in the field of music in different educational settings with different experiences in private educational institutions.

The jury members scored to evaluate the songs in the focus of the special education course outcomes. In the qualitative dimension of the research, 10 jury members were interviewed to determine the perspectives of the student teachers in music regarding the songs that they created in the focus of special education achievements through an interdisciplinary teaching approach. Information about the jury members is given in Table 1.

Table 1. Information about the Jury Members

Jury Member	Gender	Professional Seniority	Educational Background
J-1	F	0-5 years	Bachelor's Degree
J-2	F	6-10 years	Master's Degree
J-3	M	6-10 years	Master's Degree
J-4	F	16-20 years	Doctoral Degree
J-5	F	11-15 years	Doctoral Degree
J-6	M	11- 15 years	Doctoral Degree
J-7	F	6-10 years	Master's Degree
J-8	M	16-20 years	Doctoral Degree
J-9	M	11-15 years	Doctoral Degree
J-10	F	11-15 years	Doctoral Degree

In Table 1, 6 of the jury members evaluating the songs created in the focus of the special education course outcomes are women, whereas 4 are men. Considering the professional

seniority of the jury members, it is seen that 1 of them has 0-5 years of professional seniority, that 3 of them have 6-10 years of professional seniority, that 4 of them have 11-15 years of professional seniority, and that 2 of them have 16-20 years of professional seniority. In terms of educational status, it is seen that 1 of the jury members has a bachelor's degree, that 3 of them have a master's degree and that 6 of them have a PhD education.

2.3. Data Collection and Analysis

All the data obtained from the research were collected in the spring semester of the 2018-2019 academic year. In the quantitative context, analyses were carried out with the Rasch model. The Rasch model is related to the single-parameter item response theory model and based on similar measurement theories (Bond & Fox, 2015; DeVellis, 2003). Logits or log-probability units are the main units of measurement in the Rasch analysis (Engelhard, 2013). Analyses in this dimension were conducted with the Facets analysis program. At this point, it can be mentioned that the Rasch model has three surfaces. The first is the jury members (10 juries) composed of experts in the field; the second is the items in the form used by the jury members for evaluation purposes (8 items); and the third is the songs (12 songs) created by the student teachers in music in the focus of the achievements of special education courses. The song evaluation form prepared by the researcher was created after the relevant national and international literature was scanned. For the prepared form, the opinions of two experts in the field of educational sciences, two experts in the field of music education and two experts in the field of special education were received. Because it is necessary to determine the suitability of the form to be used and the level of representing the field it contains (Karasar, 2016). With the feedback from the experts, the song evaluation form was reviewed and finalized. In the evaluation form, items, such as the nuances of the song; musical rhythm in the song-degree of interpretation-integrity; the level of use of sound in singing the song (whether syllables are sung clearly; whether diction is smooth); the degree of fitness for purpose in the writing of the lyrics (being related to the special education course; including the achievements of the special education course); suitability in the level of student development in lyrics (whether students can catch the words) (the song is neither too mobile nor too slow); the degree of clarity of the lyrics (the words are clearly understood when the words are audibly interpreted with music); and musical creativity level, were included. The song evaluation form was prepared as a 5-point Likert-form consisting of 12 items. The jury members evaluated the songs in terms of their levels. The items in the song evaluation form were coded by the jury members as "1 = very bad, 2 = bad, 3 = medium, 4 = good and 5 = very good".

In the research, the interview technique was used to analyze the opinions of the jury members regarding the songs. As a qualitative data collection tool, a semi-structured and non-directive interview form developed in line with the opinions of experts through the consideration of different studies was used. For the interviews with the jury members, questions were prepared in terms of the criteria in the song evaluation form. In order to ensure the scope and appearance validity of the questions included in the interview form used as a qualitative data collection tool in the research, the opinions of five academics – including three academics in the field of music education and two academics in the field of Turkish education – were taken. It is also stated that the use of the opinion contributes to the reliability of the research since the use of expert opinions in a qualitative context is considered to be important for confirmation (Batdı, 2019). The experts evaluated the forms in terms of appearance, content and clarity. Final qualitative data collection tools were created by making necessary corrections in line with the expert opinions. In the interview form, there are questions that reveal the views of the jury members on musical rhythm in the song-degree of interpretation-integrity; the level of use of sound in singing the song; the degree of fitness for purpose in the writing of the lyrics;

suitability in the level of student development in lyrics; the degree of clarity of the lyrics; and the degree to which the song reaches its purpose.

In the research, the jury members were met, and the process based on voluntary participation was started. During the interviews with the jury members, a voice recorder was used with their permission. The interviews, which were held when the juries were free, took about 20 minutes. For the analysis of the qualitative data, the records obtained from the interviews were transferred to the computer environment. In the research, the qualitative opinions obtained from the interviews were analyzed in accordance with the content analysis and modelled with the Maxqda Analytics program. It was aimed to combine, organize and interpret common views (codes) that were similar to each other under common themes with the content analysis used to reach the concepts and related links from the qualitative data obtained. In the research, the responses given to each question were analyzed and interpreted with content analysis, and the codes were created.

2.4. Validity and Reliability

In qualitative research, instead of the expressions of validity and reliability used in quantitative research, the criteria of credibility, reliability, verifiability and transferability are used (Krefting, 1991; Lincoln & Guba, 2000; Merriam, 2013; Whittemore, Chase & Mandle, 2001). The names of the jury members participating in the study were not given within the framework of ethical principles, and the results of the data obtained in order to ensure its verification were expressed systematically and in a clear and understandable language. In order to meet the transferability criteria in the research and to provide the participants' confirmation, direct quotations were used to reveal the opinions of the jury members participating in the research. Such direct quotations in qualitative research reveal the reliability of the research (LeCompte and Goetz, 1982). Codes such as J-1 …… .J-10 were used in the quotations. In order to ensure the reliability of the research, the data of the research were analyzed separately by two different researchers. In order to contribute to the reliability of the research, the reliability calculated with the Miles & Huberman (2015) reliability formula (Reliability = Consensus \ [Consensus + Disagreement] * 100) was found as 93%. Reliability calculations over 70% are considered to be reliable for a research (Miles & Huberman, 2015).

3. Results

3.1. Quantitative Findings of the Research

3.1.1. Rasch Analysis Findings Regarding Songs Created by Student teachers in music through an Interdisciplinary Teaching Approach within the Focus of Special Educational Achievements

The opinions of the participants about the songs created by the student teachers in music with an interdisciplinary teaching approach in the focus of special education achievements were analyzed with the multi-surface Rasch measurement model. As seen in the data calibration map, the surfaces used in the research were listed as songs (S1… S12), strictness/generosity of the jury members and the suitability of the items used in the measurement tool. General information about the relevant surfaces reached as a result of the analysis is presented in Figure 1. Accordingly, the most qualified song among the songs created was presented at the top (S11 and S7 and S9), whereas the lowest quality song (S12 and S8 and S10) was presented at the bottom. However, the most generous jury members, J10 and J1, were listed from top to bottom in the jury column. Similarly, the most difficult items were presented at the top (M7), and the easiest items were presented at the bottom (M4).

```
+------------------------------------------------------------------+
|Measr|+SARKI      |+Juri      |-Madde      |RATIN|
|-----+-----------+-----------+-----------+-----|
|  2 +            +            +            +  + (5) |
|     |            |  J10       |            |       |
|     |            |  J1        |            |       |
|     |            |            |            |       |
|     |            |  J4        |            | ---   |
|     |            |  J5        |            |       |
|     |            |  J9        |            |       |
|     |            |  J6        |            |       |
|     | S11        |            |            |       |
|  1 +            +            +            +  +     |
|     | S7    S9   |            |            |       |
|     |            |            |            |  3    |
|     |            |  J3        |            |       |
|     | S2    S6   |  J2        |  M7        |       |
|     | S3         |            |            |       |
|     | S1         |            |  M2  M3  M8|       |
|  *  0  *         |  * J7      |  * M1  M5  M6 * |  * |
|     |            |            |            | ---   |
|     |            |            |            |       |
|     | S5         |            |  M4        |       |
|     | S4         |            |            |       |
|     |            |  J8        |            |       |
|     | S10        |            |            |       |
| -1 + S8         +            +            +  +     |
|     | S12        |            |            |       |
|     |            |            |            |       |
|     |            |            |            |       |
|     |            |            |            |       |
|     |            |            |            |       |
| -2 +            +            +            +  + (1) |
|-----+-----------+-----------+-----------+-----|
|Measr|+SARKI      |+Juri      |-Madde      |RATIN|
+------------------------------------------------------------------+
```
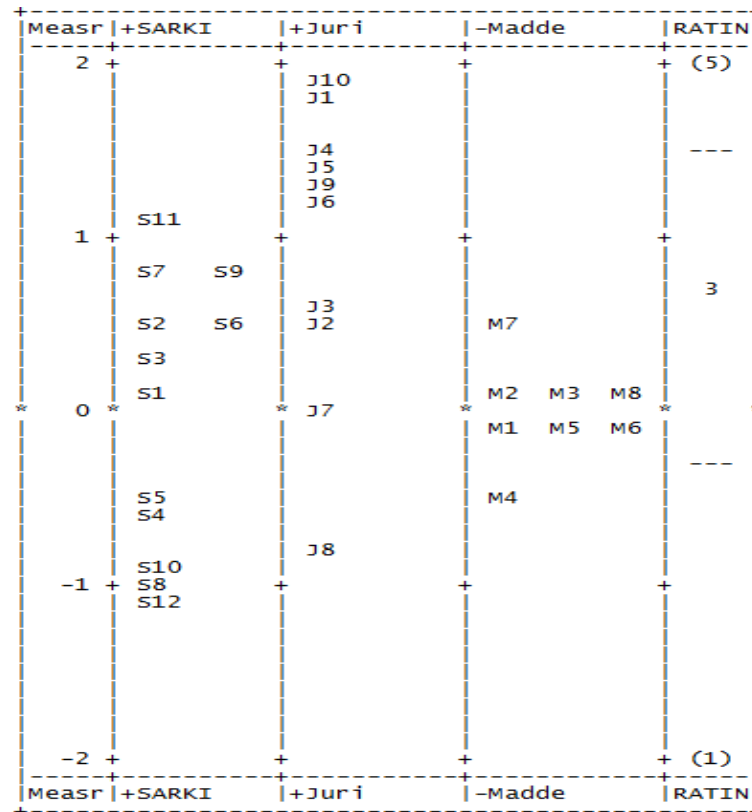
Figure 1. Data calibration map

It is also seen that a general analysis was made in the calibration map presented in Figure 1. According to the evaluations of the participants, it can be said that the songs with the codes S11, S7 and S9 were of high quality, whereas the songs with the codes S12, S8 and S10 were of low quality. When the column where the items are presented is analyzed, it is seen that the item M7 (Musical creativity level) was the most difficult one to perform and that M4 was the easiest one to perform (the degree of fitness for purpose in the writing of the lyrics (being related to the special education course, involving special education course achievements)]. It can also be stated that J10 and J1 were the most generous jury members, whereas J8, J7 and J2 were the strictest jury members. A measurement report for the songs created is given in Table 2 below.

Table 2. *Measurement Report for Songs*

Total Score	Total Count	Obsvd Average	Fair(M) Average	+ Measure	Model S.E.	Infit MnSq	ZStd	Outfit MnSq	ZStd	Estim. Discrm	Correlation PtMea	PtExp	Nu SARKI
297	80	3.71	3.75	1.11	.17	.61	-2.8	.57	-3.0	1.44	.69	.53	11 S11
287	80	3.59	3.62	.83	.16	1.13	.8	1.14	.8	.83	.58	.54	7 S7
285	80	3.56	3.59	.78	.16	.91	-.5	.91	-.5	1.08	.43	.54	9 S9
275	80	3.44	3.46	.52	.16	1.25	1.5	1.23	1.4	.72	.53	.54	2 S2
273	80	3.41	3.43	.47	.16	.88	-.7	.86	-.8	1.17	.41	.54	6 S6
267	80	3.34	3.35	.32	.16	1.84	4.6	1.89	4.7	.19	.18	.54	3 S3
257	80	3.21	3.21	.07	.16	1.03	.2	1.02	.1	.89	.67	.53	1 S1
233	80	2.91	2.86	-.53	.16	.68	-2.6	.64	-2.6	1.42	.63	.50	5 S5
230	80	2.88	2.82	-.60	.16	.93	-.4	.99	.0	1.08	.46	.50	4 S4
220	80	2.75	2.69	-.86	.16	.88	-.8	.87	-.8	1.05	.52	.47	10 S10
214	80	2.67	2.61	-1.02	.17	.85	-1.0	.79	-1.3	1.15	.58	.46	8 S8
212	80	2.65	2.58	-1.08	.17	.90	-.6	.80	-1.2	1.16	.52	.45	12 S12
254.2	80.0	3.18	3.16	.00	.16	.99	-.2	.98	-.3		.52		Mean (Count: 12)
29.5	.0	.37	.41	.75	.00	.31	1.9	.33	1.9		.13		S.D. (Population)
30.8	.0	.38	.43	.78	.00	.32	2.0	.34	2.0		.14		S.D. (Sample)

```
Model, Populn: RMSE .16  Adj (True) S.D. .73  Separation 4.49  Strata 6.32  Reliability .95
Model, Sample: RMSE .16  Adj (True) S.D. .76  Separation 4.70  Strata 6.60  Reliability .96
Model, Fixed (all same) chi-square:  246.8  d.f.: 11  significance (probability): .00
Model,  Random (normal) chi-square:  10.5  d.f.: 10  significance (probability): .39
```

When Table 2 is examined, a detailed measurement report on the effectiveness of the songs created by the student teachers in music is presented. In the table, the reliability coefficient was found to be 0.96 in the Rasch analysis. The 0.96 value obtained as the reliability coefficient indicates the reliability of the songs created. In other words, the reliability coefficient indicates that the songs are ranked with a very high level of reliability. In addition, when the other data in the table are evaluated, it is noticed that, when Chi-square test was performed with 4.70 separation index and .96 reliability coefficient, there was a statistically significant difference between the songs created ($x2 = 246.8$, sd = 11, p = 0.00). When the infit values are examined, it is seen that any song did not have an infit value lower than 0.6, but only the S3-coded song had an infit value higher than the expected upper value of 1.4. When the outfit values are examined, it is revealed that the S6-coded song had a lower outfit value than the expected lower value, while the S3-coded song had a higher outfit value. In this case, it can be said that the songs with infit and outfit values presented are not included in the expected quality control values of the infit and outfit values for the relevant criteria. In Table 3, the strictness/generosity information of the jury members' scores for group presentation competencies are given.

Table 3. *Jury Members' Strictness/Generosity Comparison*

Total Score	Total Count	Obsvd Average	Fair(M) Average	+ Measure	Model S.E.	Infit MnSq	ZStd	Outfit MnSq	ZStd	Estim. Discrm	Correlation PtMea	PtExp	Nu Jüri
349	96	3.64	3.67	1.88	.15	1.18	1.2	1.18	1.2	.81	.57	.49	10 J10
347	96	3.61	3.65	1.84	.15	.65	-2.8	.68	-2.4	1.24	.35	.49	1 J1
332	96	3.46	3.49	1.52	.14	.62	-3.2	.64	-2.9	1.27	.26	.50	4 J4
327	96	3.41	3.43	1.41	.14	1.18	1.3	1.11	.8	1.07	.76	.51	5 J5
321	96	3.34	3.37	1.29	.14	1.60	3.9	1.64	4.0	.26	.36	.51	9 J9
319	96	3.32	3.34	1.25	.14	.93	-.4	.94	-.4	.99	.42	.51	6 J6
286	96	2.98	2.95	.58	.14	.88	-.9	.83	-1.3	1.63	.85	.51	3 J3
281	96	2.93	2.90	.47	.14	.91	-.7	.90	-.7	.95	.30	.50	2 J2
259	96	2.70	2.64	.00	.15	1.24	1.7	1.26	1.7	.52	.29	.47	7 J7
229	96	2.39	2.33	-.79	.18	.67	-2.3	.57	-2.6	1.29	.58	.40	8 J8
305.0	96.0	3.18	3.18	.94	.15	.99	-.2	.98	-.3		.47		Mean (Count: 10)
37.7	.0	.39	.43	.82	.01	.30	2.2	.31	2.1		.20		S.D. (Population)
39.7	.0	.41	.45	.86	.01	.31	2.3	.33	2.2		.21		S.D. (Sample)

Model, Populn: RMSE .15 Adj (True) S.D. .80 Separation 5.38 Strata 7.51 Reliability .97
Model, Sample: RMSE .15 Adj (True) S.D. .85 Separation 5.69 Strata 7.91 Reliability .97
Model, Fixed (all same) chi-square: 262.0 d.f.: 9 significance (probability): .00
Model, Random (normal) chi-square: 8.7 d.f.: 8 significance (probability): .37

In Table 3, information on the strictness/generosity comparison of the jury members about the qualities of the songs is presented. As a result of the evaluation of the jury members, it can be said that the J10-coded jury member was the most generous one while the J8-coded jury member was the strictest one. Therefore, it can be stated that J10 was the most generous jury member with 349 points and J8 was the strictest jury member with 229 points. In addition, the jury separation index was calculated as 5.69 and the reliability coefficient as 0.97. There was a statistical difference between the scores given by the jury members in terms of strictness/generosity ($x2 = 262.0$, sd = 9, p = 0.00). When the "infit " and "outfit" statistical values regarding the surfaces are analysed, it is seen that some jury members did not have the expected quality control values (1.4 - 0.6 range). It is seen that the average of the squares of the "infit" values of one jury member (J9) and the average of the squares of the "outfit" values of two jury members (J8, J9) were out of the expected values. Statistics on the items used in the evaluation of the songs created by the student teachers in music with an interdisciplinary approach in the focus of special education course achievements are given in Table 4.

Table 4. *Item Statistics Used in the Evaluation of Songs*

```
+------------------------------------------------------------------------------------------------+
| Total  Total  Obsvd  Fair(M)|  -     Model | Infit      Outfit    |Estim.| Correlation |           |
| Score  Count  Average Average|Measure  S.E. | MnSq ZStd  MnSq ZStd |Discrm| PtMea PtExp | N Madde    |
|--------------------------------------+--------------+----------------------+------+-------------+------------|
|  354    120    2.95   2.89  |  .48    .13 | 1.16  1.3  1.11   .8 | 1.00 |  .56   .60  | 7 M7       |
|  375    120    3.13   3.10  |  .11    .13 |  .81 -1.6   .83 -1.3 | 1.10 |  .65   .61  | 2 M2       |
|  376    120    3.13   3.11  |  .09    .13 | 1.04   .3  1.01   .1 |  .91 |  .56   .61  | 3 M3       |
|  377    120    3.14   3.12  |  .07    .13 |  .68 -3.0   .64 -3.2 | 1.40 |  .69   .61  | 8 M8       |
|  385    120    3.21   3.21  | -.07    .13 | 1.15  1.2  1.15  1.1 |  .75 |  .65   .62  | 6 M6       |
|  387    120    3.22   3.23  | -.10    .13 |  .95  -.3   .92  -.6 | 1.10 |  .63   .62  | 1 M1       |
|  388    120    3.23   3.24  | -.12    .13 | 1.10   .8  1.11   .9 |  .83 |  .56   .62  | 5 M5       |
|  408    120    3.40   3.43  | -.47    .13 | 1.08   .6  1.04   .3 |  .99 |  .63   .62  | 4 M4       |
|--------------------------------------+--------------+----------------------+------+-------------+------------|
|  381.2  120.0  3.18   3.17  |  .00    .13 | 1.00  -.1   .98  -.2 |      |  .62        | Mean (Count: 8)      |
|   14.3    .0    .12    .14  |  .25    .00 |  .16  1.4   .16  1.4 |      |  .05        | S.D. (Population)    |
|   15.3    .0    .13    .15  |  .27    .00 |  .17  1.5   .17  1.5 |      |  .05        | S.D. (Sample)        |
+------------------------------------------------------------------------------------------------+
Model, Populn: RMSE .13  Adj (True) S.D. .21  Separation 1.59  Strata 2.46  Reliability .72
Model, Sample: RMSE .13  Adj (True) S.D. .23  Separation 1.75  Strata 2.66  Reliability .75
Model, Fixed (all same) chi-square:  28.0  d.f.: 7  significance (probability): .00
Model,  Random (normal) chi-square:   5.6  d.f.: 6  significance (probability): .47
```

In Table 4, information regarding the suitability of the relevant items used for the purpose of evaluating the songs created by the student teachers in music is presented. When the statistics regarding the difficulty analysis of the items in the table are analyzed, it can be said that the separation index is 1.75 and the reliability coefficient is .75. The relevant value (.75) reflects that the items are reliable in evaluating the songs. In addition, it can be said that there is a significant difference between the difficulties of the items in the measurement tool ($x2 = 28.0$, sd = 7, p = 0.00). In this context, the most difficult item in the scale is the M7-coded item "musical creativity level", whereas the easiest material is the M4-coded item "the degree of fitness for purpose in the writing of the lyrics".

However, since it is seen that the standard error (RMSE) related to the analysis of the items presented in the measurement tool is .13, it can be said that this value is low in determining the qualities of the songs created through an interdisciplinary teaching approach in the focus of special education achievements. Considering this error rate obtained as a result of the analysis, it was observed that the corrected standard deviation value (Adj S.D. =. 23) was below the critical value of 1.0.

As a result of the analysis, it is seen that there is no data that exceeds the limit values determined for the infit and outfit statistical values regarding the surfaces reached. This finding can be said to be consistent with the items used in the evaluation of the songs composed, while the mean of all the items have acceptable properties; however the mean of the squares of the infit and outfit values are within the expected values. The interaction analysis of the songs evaluated by the jury members is presented in Table 5 below.

Table 5. *Interaction Analysis of the Songs Evaluated by the Jury Members*

Observd Score	Expctd Score	Observd Count	Obs-Exp Average	Bias+ Size	Model S.E.	t	d.f.	Prob.	Infit MnSq	Outfit MnSq	SARKI Sq Nu SAR	measr+	Jüri Nu Pua	measr+
16	28.24	8	-1.53	-4.21	1.02	-4.13	7	.0044	.0	.0	99 3 S3	.32	9 J9	1.29
16	28.08	8	-1.51	-4.17	1.02	-4.09	7	.0046	.0	.0	63 3 S3	.32	6 J6	1.25
24	30.98	8	-.87	-1.69	.47	-3.62	7	.0085	.2	.2	114 6 S6	.47	10 J10	1.88
23	30.03	8	-.88	-1.64	.48	-3.44	7	.0108	.7	.7	105 9 S9	.78	9 J9	1.29
16	24.81	8	-1.10	-3.43	1.02	-3.37	7	.0119	.0	.0	79 7 S7	.83	7 J7	.00
26	32.01	8	-.75	-1.58	.47	-3.36	7	.0120	.2	.2	7 7 S7	.83	1 J1	1.84
16	24.72	8	-1.09	-3.42	1.02	-3.35	7	.0122	.0	.0	52 4 S4	-.60	5 J5	1.41
16	23.96	8	-1.00	-3.25	1.02	-3.19	7	.0153	.0	.0	25 1 S1	.07	3 J3	.58
16	23.54	8	-.94	-3.16	1.02	-3.10	7	.0174	.0	.0	58 10 S10	-.86	5 J5	1.41
16	22.82	8	-.85	-2.99	1.02	-2.94	7	.0218	.0	.0	56 8 S8	-1.02	5 J5	1.41
19	26.06	8	-.88	-1.77	.61	-2.91	7	.0227	.7	.7	83 11 S11	1.11	7 J7	.00
16	22.57	8	-.82	-2.94	1.02	-2.88	7	.0235	.0	.0	60 12 S12	-1.08	5 J5	1.41
16	21.41	8	-.68	-2.66	1.02	-2.61	7	.0350	.0	.0	29 5 S5	-.53	3 J3	.58
34	29.58	8	.55	1.41	.60	2.34	7	.0521	.4	.4	109 1 S1	.07	10 J10	1.88
29	23.37	8	.70	1.28	.51	2.52	7	.0396	.8	.8	74 2 S2	.52	7 J7	.00
33	27.72	8	.66	1.52	.59	2.59	7	.0359	1.8	1.9	49 1 S1	.07	5 J5	1.41
35	30.07	8	.62	1.64	.62	2.65	7	.0328	.7	.7	67 7 S7	.83	6 J6	1.25
32	25.80	8	.77	1.62	.57	2.84	7	.0250	.0	.0	30 6 S6	.47	3 J3	.58
36	30.22	8	.72	2.00	.65	3.09	7	.0175	1.5	1.5	103 7 S7	.83	9 J9	1.29
32	25.11	8	.86	1.77	.57	3.11	7	.0171	.0	.0	27 3 S3	.32	3 J3	.58
32	25.07	8	.87	1.78	.57	3.12	7	.0168	.0	.0	53 5 S5	-.53	5 J5	1.41
26	19.84	8	.77	1.48	.47	3.14	7	.0163	.2	.2	22 10 S10	-.86	2 J2	.47
34	27.19	8	.85	1.99	.60	3.32	7	.0128	.4	.4	97 1 S1	.07	9 J9	1.29
26	19.18	8	.85	1.69	.47	3.61	7	.0086	.5	.5	76 4 S4	-.60	7 J7	.00
38	29.52	8	1.06	3.19	.80	3.99	7	.0053	.8	.8	50 2 S2	.52	5 J5	1.41
28	19.56	8	1.06	2.02	.49	4.13	7	.0044	.4	.4	87 3 S3	.32	8 J8	-.79
25.4	25.40	8.0	.00	-.15	.61	.04			.5	.5	Mean (Count: 120)			
6.0	4.30	.0	.52	1.38	.19	1.91			.5	.5	S.D. (Population)			
6.0	4.32	.0	.52	1.38	.19	1.92			.5	.5	S.D. (Sample)			

Fixed (all = 0) chi-square: 438.6 d.f.: 120 significance (probability): .00

The interaction analysis of the songs created by the student teachers in music through an interdisciplinary teaching approach in the focus of special education acquisitions is shown in Table 5. When Table 5 is examined, it can be stated that the jury members show strict or generous behaviors in evaluating the songs. In this case, it can be said that, in the interaction analysis of the songs, the J9-coded jury member gave 16 points to the S3-coded song instead of 28 points. Similarly, it can be stated that the J1-coded jury member showed a biased behavior by giving 26 points to the S7-coded song instead of 32 points. On the contrary, it was understood that the J8-coded jury member was generously biased by giving 28 points to the S3-coded song instead of approximately 20 points. Considering these, it can be said that the jury members, who scored similarly, performed biased behaviors in scoring.

3.2. Qualitative Findings of the Research

3.2.1. Views of jury members regarding songs created by student teachers in music through an interdisciplinary teaching approach within the focus of special educational achievements

In this part of the study, the qualitative findings obtained from the opinions of the jury members are included. Interviews were conducted with the jury members based on the criteria for evaluating the songs used in the Rasch analysis. The themes and codes obtained from the interviews with the jury were modelled on the figure with the Maxqda Analytics program. In this context, the interview data of the research are given in a complementary and supportive way to the other data of the research. The model of the opinions of the jury members about the musical rhythm in the song-degree of interpretation-integrity is given in Figure 2.
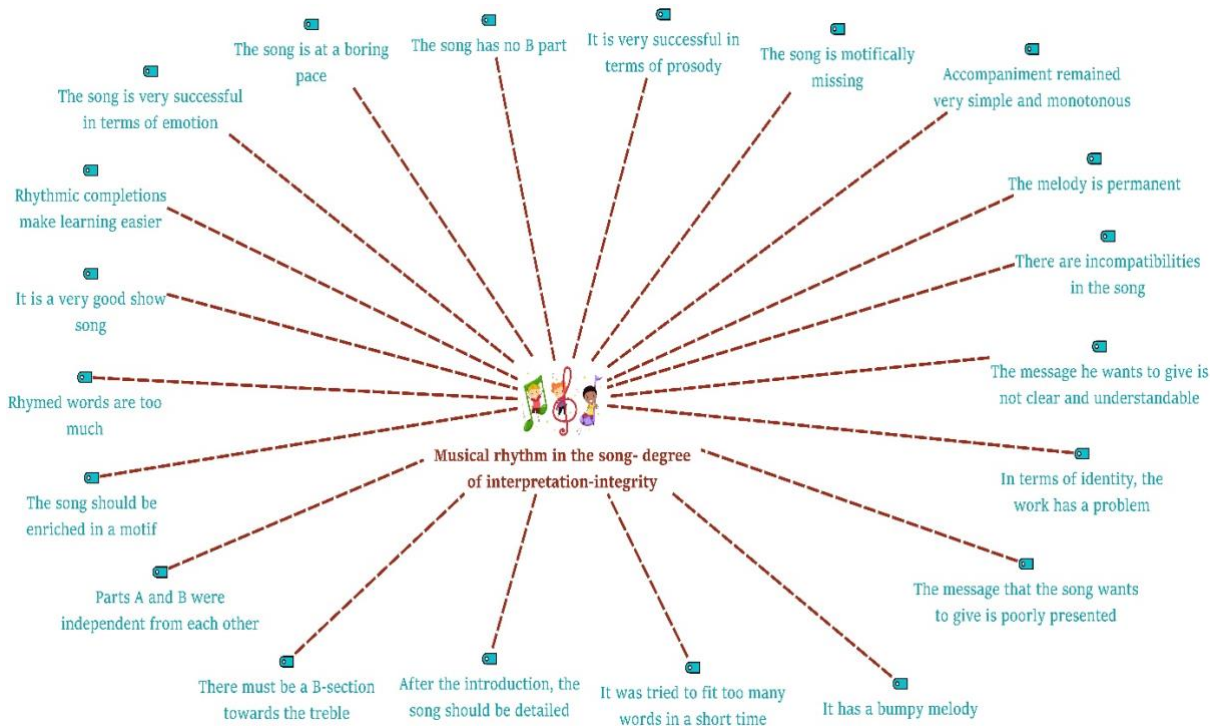
Figure 2. Views regarding musical rhythm in the song-degree of interpretation-integrity

When the views regarding the musical rhythm in the song-degree of interpretation-integrity are considered, it is seen that the jury members considered the songs from different perspectives. Some of these views coded in line with the opinions of the jury members are as follows: "*Accompaniment remained very simple and monotonous*", "*Rhythmic completions make learning easier*", "*The song should be enriched in a motif*", "*The song is at a boring pace*", "*Rhymed words are too much*", and "*It is very successful in terms of prosody*". The examples of direct quotations taken from the views of the jury members regarding the prominent codes are presented below:

> "The song is effective in melodic structure and interpretation. The song can really be used in soundtracks…. I think it would be beneficial to enrich the work in terms of motifs; so, I think the effect of the song could be much more. Motifically, the A and B parts of the song were independent from each other." (J1)

> "… I think you should breathe a little in the song. The same rhythm and nuance created a bias effect. How you sing is good, but it is necessary to shape the work with a more architectural approach in a musical sense." (J4)

The model of the views of the jury members about the level of use of sound in singing the song is given in Figure 3.
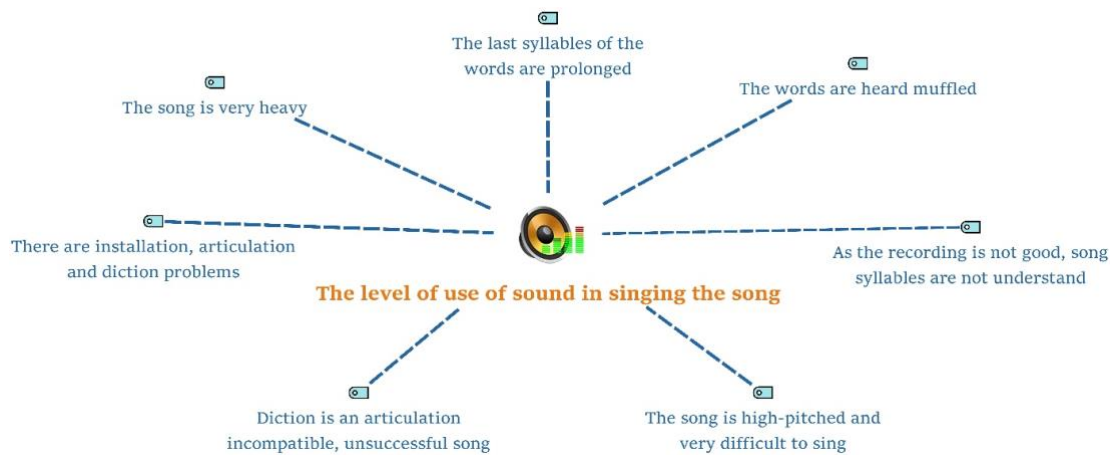
Figure 3. Views about the level of use of sound in singing the song

When the views of the jury members about the level of use sound in singing the song are considered, it is seen that they used such codes as *"There are installation, articulation and diction problems", "The song is high-pitched and very difficult to sing", and "Diction is an articulation incompatible, unsuccessful song"*. It is seen that the jury members emphasized the fact that the songs were high pitched, that the words were muffled, and that it was, therefore, very difficult to record in a proper way. The examples of direct quotations taken from the views of the jury members are presented below:

 "The installation structure is felt very dominantly in the song. I can say that there are serious problems with articulations as well as the proper sounding of the words of the song." (J2)

 "The song is very high-pitched for children and very difficult to sing ... The last syllables of the words "we will see" and "we will not do" were prolonged in a muffled way. In the song, it is necessary to express the open sounds with smaller notes and the closed sounds with larger notes." (J3)

The model of the opinions of the jury members about the degree of fitness for purpose in the writing of the lyrics is given in Figure 4.
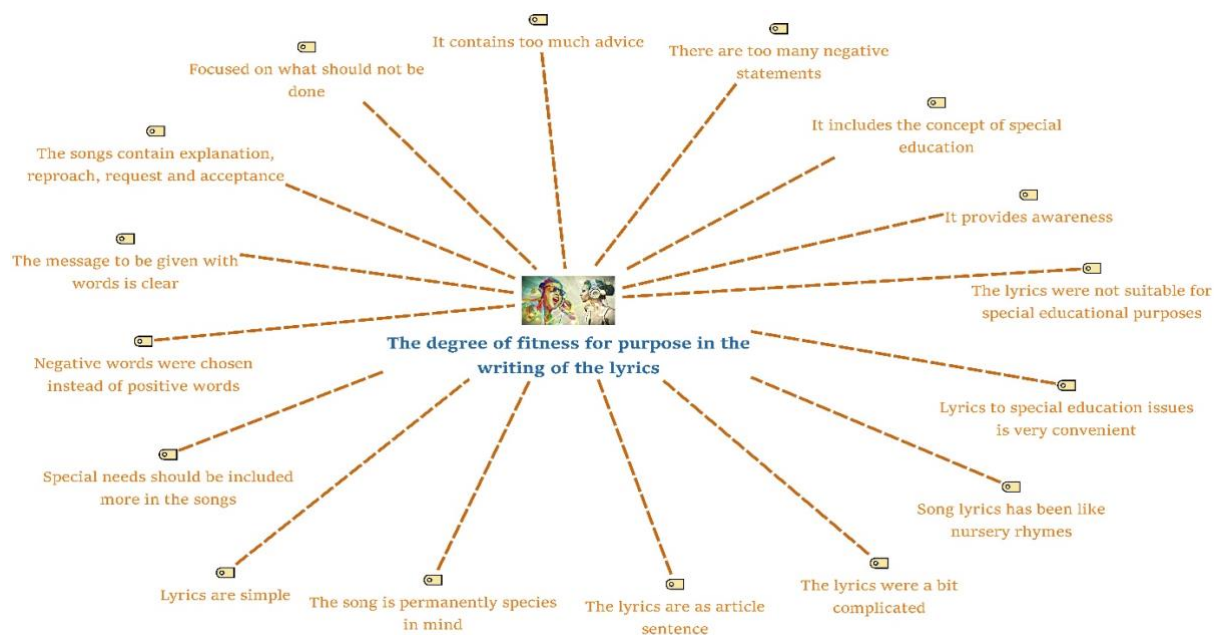

Figure 4. Views about the degree of fitness for purpose in the writing of the lyrics

When the views of the jury members about the degree of fitness for purpose in the writing of the lyrics are considered, it is seen that the jury members used codes which are related to the special education course and include special education achievements. These codes are: *"It provides awareness", "It includes the concept of special education", "Special needs should be included more in the songs", "The lyrics were not suitable for special educational purposes",* and *"Lyrics to special education issues is very convenient"*. The examples of direct quotations taken from the views of the jury members are presented below:

> "The song was really good; I would like to congratulate our student teacher. The lyrics of the song were wholly suitable for special educational purposes." (J1)

> "The song contains explanation, reproach, request and acceptance. I can say that it is a great song that might create awareness. Its first part is too long and there are some problems in the prosody; besides, the feeling of 'begging' is felt intensely. The expression 'please' should not be used that often." (J5)

> J-7: "I think that the lyrics of the song has reached its purpose. Until the last part of the song, the purpose and message of the song had been clear; however, there is no need for such messages as "we are the ones who are faulty" in the last part of the song. Words like denial and contempt may not be in the vocabulary of children."

The model of the opinions of the jury members about suitability in the level of student developments in lyrics is presented in Figure 5.
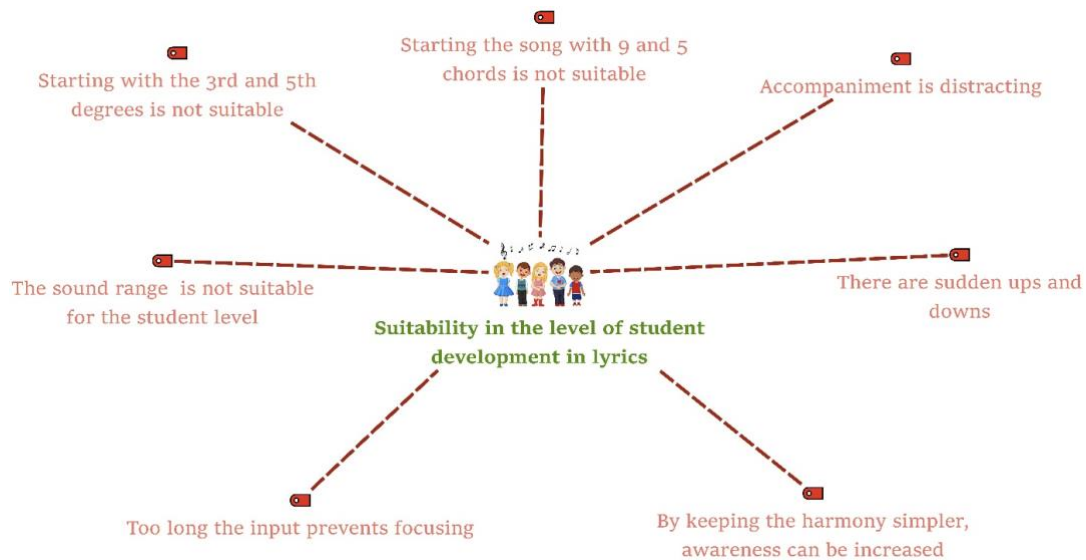
Figure 5. Views about suitability in the level of student developments in lyrics

When the views of the jury members about suitability in the level of student developments in lyrics are considered, it is seen that the jury members used such codes: *"Starting the song with 9 and 5 chords is not suitable", "Starting with the 3rd and 5th degrees is not suitable", "The sound range is not suitable for the student level", "By keeping the harmony simpler, awareness can be increased",* and *"Accompaniment is distracting"*. The examples of direct quotations taken from the views of the jury members are presented below:

> "I think that starting the song with 9 and 5 chords and with 3rd and 5th degrees might make the teaching process more difficult. Starting with 3rd and 5th degrees should not be preferred since the song is not very comprehensive and the tone changes cannot easily be reflected … There are also not many harmonic songs. It would be better to start from the first degree, I think. Also, as accompaniment is

distracting, it would affect the dimensions of the permanence and effectiveness of the song." (J2)

"I think that the song is simple and therefore catchy. In this context, it is a beautiful song that can serve its purpose by making students accompany the song." (J10)

The model of the opinions of the jury members about the degree of clarity of the lyrics is presented in Figure 6.
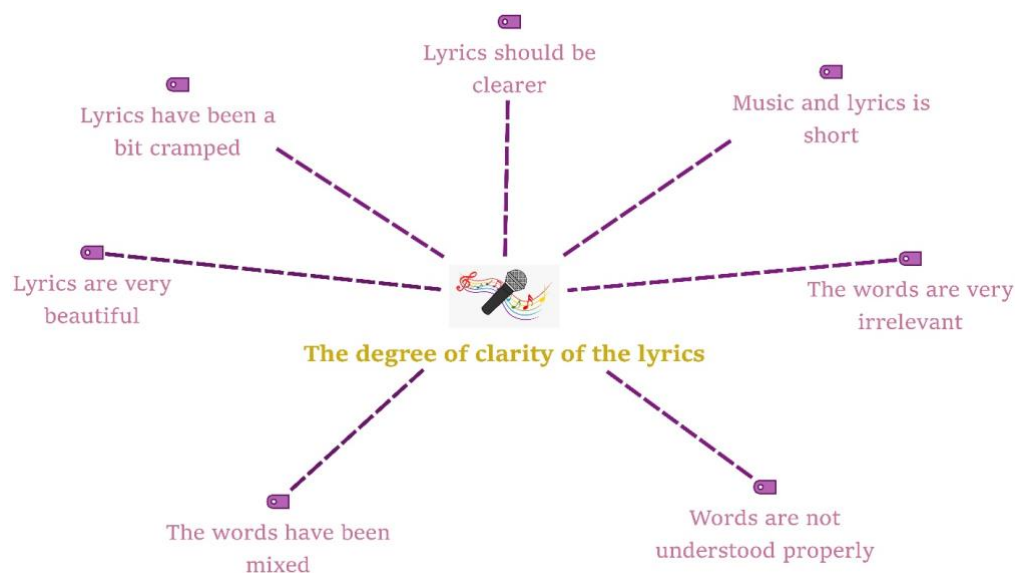
Figure 6. Views about the degree of clarity of the lyrics

When the views of the jury members about the degree of clarity of the lyrics are considered, it is seen that the jury members used such codes: "The words have been mixed", "The words are very irrelevant", "Lyrics should be clearer", "Words are not understood properly", and "Lyrics have been a bit cramped". The examples of direct quotations taken from the views of the jury members are presented below:

"The words cannot be understood clearly. While listening to the song, I think the words do not match the music and the words are not consistent with the music." (J8)

"The words have been a little confusing in the focus of children who need special education ... So, the words are semantically mixed but seemed to be cramped." (J5)

When the jury members are considered as a whole, the model of their views about the degree to which the song reaches its purpose is presented in Figure 7.

Figure 7. Views about the degree to which the song reaches its purpose

The views of the jury members regarding the degree to which the song reaches purpose include codes, some of which are *"The melody and lyrics of the song are not very suitable"*, *"The song has a different structure"*, *"It is an extraordinary work"*, *"Melodies and lyrics are incompatible"* and *"The piece is made in a different style"*. The examples of direct quotations taken from the views of the jury members are presented below:

> "The song was created with a different style and performance. It is an extraordinary experiment, and in many ways, it is a beautiful work; however, it can be difficult for children to listen to and understand it … It is more effective to transform this song in accordance with the age and level of children." (J7)

> "The song is really beautiful ... It reflects its special educational achievements so in a great way and in integrity ... It can be pointed out that that it is actually a very beautiful piece in terms of musical motifs, nuances, rhythm." (J3)

3.2.2. The conceptual structure of the lyrics created by the student teachers in music through an interdisciplinary approach with the focus of special education achievements

In this part of the study, qualitative findings related to the prominent concepts in the song lyrics written by the student teachers in music are included. The word cloud consisting of the conceptual structures of the lyrics written by the student teachers about special education is given in Figure 8.
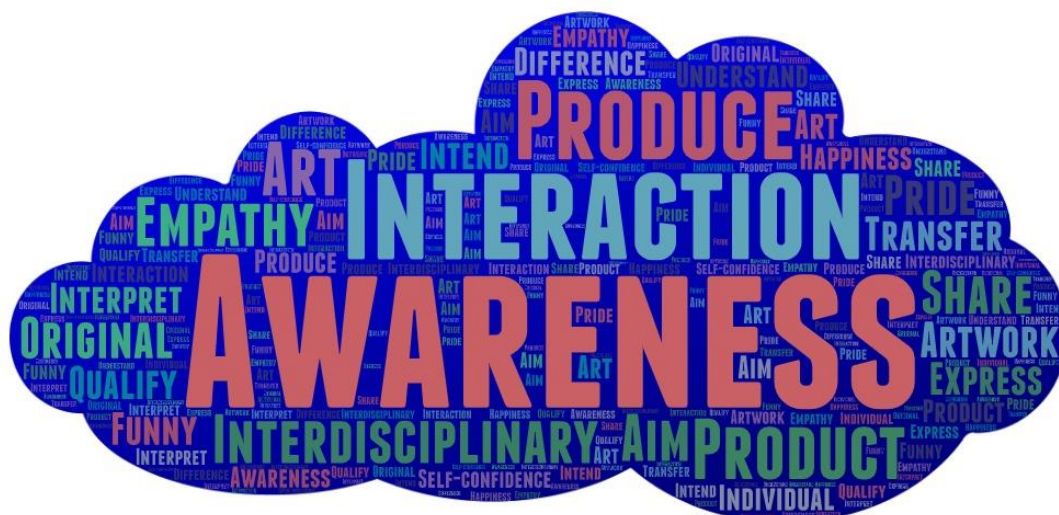
Figure 8. Word cloud for concepts that stand out in student teachers' lyrics

The word cloud consisting of the conceptual structures in the lyrics created by the student teachers in music through an interdisciplinary approach with the focus of special education achievement is presented in Figure 8. It is observed that the student teachers frequently include concepts such as *"Interdisciplinary"*, *"Empathy"*, *"Awareness"*, *"Individual difference"*, *"Interaction"*, and *"Production"*.

4. Discussion, Conclusion and Suggestions

It should be noted that this study is important in terms of using both the Rasch measurement analysis and the Maxqda quantitative data analysis, in which quantitative and qualitative contexts are considered together. Only a few studies on performance evaluation in the field of music education have been reported the literature (Wesolowski, Wind and Engelhard, 2015). Although studies using the Rasch modelling have been popularized in other areas for many years, there is little evidence that they have been used in music research with a few exceptions (Bergee & Antonetti, 2010; Pascoe & Waugh, 2001; Springer, Rojas & Bradley, 2014; Wesolowski et al., 2015 Yim, Abd-El-Fattah and Lee, 2007). Applications of the Rasch model provide powerful benefits compared to traditional statistical approaches. The Rasch analysis allows researchers and practitioners to work with actual range level measurements (Bond & Fox, 2015; DeVellis, 2003; Engelhard, 2013). In addition, the Rasch model provides the opportunity to use and develop high-quality measurement tools that do not vary between the distribution of items and individuals (Bond & Fox, 2015; Engelhard, 2013). One or more participants/referees must always participate in performance evaluations in music (Boyle & Radocy, 1987; Fiske, 1983; Forbes, 1994). For this reason, it is of great importance to use the Rasch measurement model with a multi-perspective approach in the evaluation of the music performances of music educators.

Considering the results of the research, it can be seen that the results obtained from both analyses support each other. When the results of the Rasch analysis are examined, the analyses were carried out in terms of the songs created (S1… S12), the evaluation of the quality of the materials used (M1… ..M8), and the strictness/generosity of the jury members (J1… ..J10). Within this framework, among the songs created, the most qualified song (S11 and S7 and S9) and the lowest quality song (S12 and S8 and S10) were determined. Also, it was determined that jury members J10 and J1 were the most generous evaluators, while jury members J8 and J7 and J2 were the strictest evaluators. Decision makers need to verify that evaluative processing is valid, reliable, and fair. The differences of the evaluators' schemes in the use of

assessment tips and in the cognitive processes, on which the scoring is based (Wolfe, Kao, & Ranney,1998), and the scoring ratings observed should be more frequently associated with the characteristics of the evaluators and less associated with the performances (Engelhard, 2013).

In the research, the most difficult item among the song evaluation items was the musical creativity level (M7), while the easy-to-perform item was the degree of fitness for purpose in the writing of the lyrics (M4) (being related to the special education course; containing the achievements of the special education course). The fact that musical creativity, which is one of the basic learning areas in the music course curriculum, cannot be fully concretized due to insufficient application examples can also be emphasized in the literature (Küçük, 2008). In the pre-service period, the absence of the basic area of musical creativity in the songs created by the student teachers can be evaluated as an indication that the gains of this basic area cannot be functionally gained in the teacher education program.

The reliability coefficient of the songs created by the student teachers in music was found to be 0.96 in the Rasch analysis. When the infit values were examined in the study, it was found that only the S3-coded song had an infit value higher than the expected upper value of 1.4 infit value. In terms of outfit values, the S6-coded song had an outfit value lower than the expected lower value, while the S3-coded song had a higher outfit value. In this case, it can be said that the songs with infit and outfit values presented were not included in the expected quality control values of the infit and outfit values for the relevant criteria because the determined values should be in the range of 1.4-0.6 (Wright and Linacre, 1994). In this case, it can also be said that the songs with infit and outfit values presented were not included in the expected quality control values of the infit and outfit values for the relevant criteria. When the "infit" and "outfit" statistical values regarding the surfaces are analyzed, it is seen that some jury members were not among the expected quality control values (1.4 - 0.6 range). It is seen that the average of the squares of the "infit" values of one jury member (J9) and the average of the squares of the "outfit" values of two jury members (J8, J9) were out of the expected values. When the statistics related to the difficulty analysis of the items are examined, it can be stated that the reliability coefficient is .75 and that they are reliable in terms of evaluating the songs created.

In the research conducted by Akın and Baştürk (2012) in the field of music education, it was determined that there was no performance with infit and outfit statistics in the Rasch analysis used in the evaluation of basic skills in violin education and that the evaluators did not show any differences in terms of strictness/generosity. In addition, the questions in the evaluation form of violin playing skills were found to serve the purpose. In this context, the results of the research differ from the results of the research conducted by Akın and Baştürk (2012), where a performance-based assessment, which is one of the basic areas of music education, took place.

In order to contribute to the results of the Rasch analysis, interviews with the jury members in a qualitative context for the songs created through an interdisciplinary teaching approach in the focus of special education achievements were presented with the models created with the Maxqda program. When the qualitative data results of Maxqda are analyzed, detailed and complementary results were revealed with this study in which the student teachers in music wrote and composed their lyrics in the light of their special educational achievements. In the other qualitative findings of the study, the lyrics created by the student teachers in music through an interdisciplinary teaching approach in the focus of special education achievements were examined and the concepts of empathy, interaction, individual difference and interdisciplinary approach were seen to become prominent in the lyrics.

Using the data together in quantitative and qualitative dimensions contributes to the reliability and data enrichment of the study (Bamberger, 2012). Conducting the research in two

different dimensions, therefore, brought more detailed details to the study. This study is thought to provide a basis for researchers to carry out future studies using different methods. With this study, it is thought that student teachers in music can combine their knowledge of the field of special education with their own professional studies through an interdisciplinary approach and contribute to their experience in the arrangements, practices and adaptations that can be made for their students. In the light of the results of the research, it is recommended to perform different multi-level studies based on performance in which an interdisciplinary teaching approach in the field of music education, and field courses along with didactic knowledge courses are integrated in order to increase the quality of teacher education before starting the teaching profession.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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COMPARISON OF MATLAB AND SPSS SOFTWARE IN THE PREDICTION OF ACADEMIC ACHIEVEMENT WITH ARTIFICIAL NEURAL NETWORKS: MODELING FOR ELEMENTARY SCHOOL STUDENTS

Research Article

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COMPARISON OF MATLAB AND SPSS SOFTWARE IN THE PREDICTION OF ACADEMIC ACHIEVEMENT WITH ARTIFICIAL NEURAL NETWORKS: MODELING FOR ELEMENTARY SCHOOL STUDENTS

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Abstract

In this study, it was aimed to compare the predictions of the academic achievement of the artificial neural networks (ANN) run in MATLAB and SPSS software and to determine the factors related to their academic achievement. Sample consisted of 465 students who were studying at Grade 4 in primary schools in the Central Anatolian Region of Turkey in 2017. A 12-questions questionnaire was used as the collection tool. For the content validity of the questionnaire, expert opinions were received. The KR20 reliability coefficient was calculated as .60. An exploratory factor analysis was run for the construct validity. In the ANN model, the items related to the academic achievement in the questionnaire were considered as independent variables / inputs, and the academic achievements of the previous year as the dependent variables / outputs. The predictions of the academic achievement of the ANN models were analyzed in MATLAB R2013a and SPSS 24.0 software and the regression coefficients of the independent variables were examined. It was found that MATLAB software had a higher rate of the correct prediction compared to SPSS. In the regression coefficients of the independent variables, some differences and similarities between the results of MATLAB and SPSS were found.

Keywords: Artificial neural network, academic achievement prediction, MATLAB, SPSS

1. Introduction

Education includes all of the social, cultural and personal processes that individuals go through to acquire desired talents, skills and other types of behavior that are valuable in the society. Through education, people's ideas, knowledge, goals, perspectives, attitudes, and moral criteria can continuously change. Thus, education is a lifelong process that starts in the family and continues throughout the life (Demirel & Kaya, 2015).

Along with the developments of technology and globalization, big and inexorable changes have occurred in society and in other fields of life. Therefore, educational standards should be increased to keep pace with these innovations and changes brought with the 21st century. In the 21st century, scientific predictions on students' academic achievement have been given a great importance as they have a significant impact on educational policies. The importance of scientific predictions on students' academic achievement is a worldwide accepted fact in order

to be able to look at the future more firmly, to realize the risks that life brings to us and to deal with the problems encountered. Individuals are expected to be able to adapt to the rapid developments in the world and make important decisions about the future. While planning the future, it is vital to make predictions for academic achievement as well as providing professional consultant services to students about their future career involving the school-family-state union. In this view, it becomes obvious that scientific predictions on students' academic achievement would be beneficial in individuals' career development (Bahadır, 2013).

Many different variables have been used to predict students' academic achievement by researchers (Bekele & McPherson, 2011; Fenollar, Roman & Cuestas, 2007; Kuncel, Hezlett & Ones, 2004; Kyndt, Musso, Cascallar & Dochy, 2015; Mukta & Usha, 2009; Turner, Chandler & Heffer, 2009). In addition, many national and international tests (e.g. Programme for International Student Assessment) have been conducted to evaluate students' academic achievement. Based on results on these tests countries are compared to each other to monitor their educational success. In these tests, students are usually asked to answer questions measuring their academic achievement and others variables related to their academic achievement. However, results of these international tests have showed that the student academic achievement is not at the satisfactory level. One reason could be that all variables affecting student academic achievement are not correctly included. If all the variables influencing student academic achievement can be revealed, students' academic acvhievement may reach at the satisfactory level (Tepehan, 2011). Moreover, a better prediction of academic achievement may have potential to contribute positively to the individual's learning process. These predictions are vital because it enable educators to early diagnose the low academic achievement and take required steps to turn a failure into success.

Many studies have focused on predicting students' academic achievement (Colom, Escerial, Chun Shih & Privado, 2007; Hailikari, Nevgi & Komulainen, 2008; Krumm, Ziegler & Buehner, 2008). In these studies, different methods have been used by researchers. Methods used in education are generally the statistical techniques including regression, discriminant analysis and structural equation modeling. Because these statistical methods have their own limitations in the prediction of academic achievement, in recent years another novel method, called Artificial Neural Networks (ANN), have emerged. The ANN has already started to be used in some other fields including medicine, engineering, meteorology and economics. Research has reported that the ANN is a strong tool to make accurate predictions (Musso, Kyndt, Cascallar & Dochy, 2013).

One advantage of the ANN model is that it allows research make complex and nonlinear model. In educational research, it is a strong tool as the relationships between the variables regarding academic achievement are rather complex and has a nonlinear structure. In recent years, the ANN has become preferred in many areas because it is an effective tool to examine the relationships between variables, classifying and predicting the results with a high accuracy. This method also allows researchers to evaluate multiple variables simultaneously. Moreover, the ANN reduce the negative results of the failure by predicting the students' possible low academic achievement in the future and increase the chances being successful. Thus, this is an important tool for students' future academic achievement predictions. Similarly, examining variables related to the academic achievement among high achiever students may provide an understanding of factors causing to positive results (Musso & Cascallar, 2009; Musso, Kyndt, Cascallar & Dochy, 2013).

1.1. Artificial Neural Networks

The ANN model has emerged as a product of human's endeavor to discover the Nature. The ANN is parallel the information processing structures that are inspired by the human brain in which each consists of neurons with its own memory. In other words, it is a method designed to simulate the biological nervous system. A nerve cell contains neurons linked to each other in various ways in a form of network. These networks are used to reveal the relationship between the variables (Bahadır, 2013; Budak & Erpolat, 2012).

Learning in biological systems occurs by adjusting synaptic connections between neurons. In other words, since their birth, humans have learnt thorugh a process called "learning by living" (Figure 1).
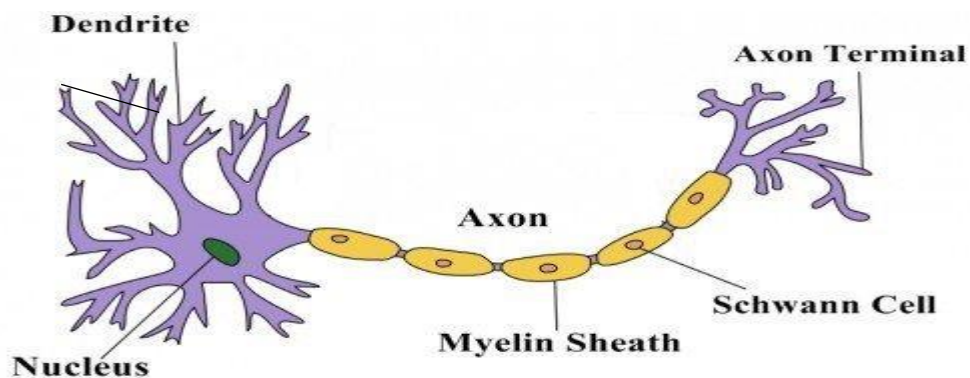
Figure 1. Structure of a nerve cell (Towle and Bradley, 2006)

The general structure of a neuron is as shown in Figure 1. The parts and functions of the neuron are as follows (Öztemel, 2006; Yurtoğlu, 2005):

Dendrites; Thse parts take electrochemical signals from other nerve cells and deliver them to the nucleus. Hundreds of dendrites can come out of a nerve cell. Nucleus: The nucleus is the body of the nerve cell. It is a microprocessor unit where the information transmiited through dendrites are combined and made sense, briefly processed and the outputs are transferred to the axon. Axon; This part sends electrochemical signals and outputs produced by the nerve cell to other nerve cells. There are many synapses at the tip of an axon. Synapses; They are the junction points that link the axon to the dendrites of other nerve cells Just as biological neural Networks are made up of nerve cells, the ANN is made up of artificial neural cells. Artificial nerve cells, which are the basic processing units of an ANN, simulate the four basic elements of the biological nerve cells described above. The general representation of an artificial nerve cell is displayed in Figure 2.
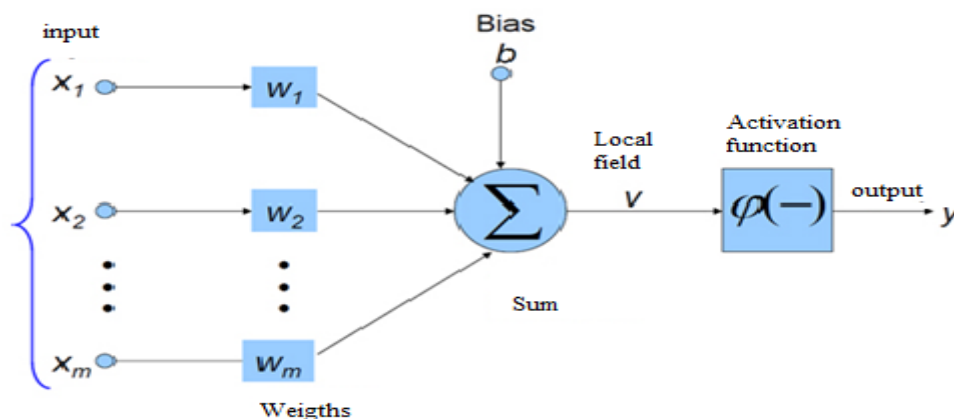
Figure 2. Model of Artificial nerve cells (Boukadıda, Hassen, Gafsı and Besbes, 2011)

In the learning process, the brain shows continuous development and change. As indivuals live and experience, synaptic connections are created and new connections are established. That is how learning occurs. The same is also true for the ANN. Like learning happens through experience, in the ANN process, with processing input / output data to make the training algorithm repeatedly until a link is established between the link weights using this data (Bahadır, 2013). As a statistical methodology the ANN has been actively utilized in many fields including business, biology, medicine, environmental research and terrorist attack predictions. In recent years, it has been used as a statistical method in social sciences to classify and define the components of data. However, although studies utilizing this statistical method have gained attention in social science, there is a limited study that use the ANN in measurement and evaluation in educational studies. These studies have used the ANN to compare different ways of prediction student achievements (Bahadır, 2016; Çırak & Çokluk, 2013; Gorr, Nagin & Szczypula 1994; Özçınar, 2006; Toprak, 2017), to predict student failures in advance (Güneri & Apaydın, 2004), to regress and classify student academic achievement (Campbell Hunt, 2000; Özdemir, 2015; Tepehan, 2011) and to determine the variables that affect achivement (Oladokun, Sc, Adebanjo & Charles-Owaba, 2008; Özdemir, 2015; Turhan, Kurt & Engin, 2013; Tezbaşaran, 2016; Aydoğan, 2018).

In addition, in literature studies exist that the ANN is compared with other statistical methods. Some studies compared the ANN with data mining (Ayık, Özdemir & Yavuz 2007; Üçgün, 2009; Şengür, 2013), linear regression (Sittirug, 1997), progressive regression (Gorr, Nagin & Szczypula, 1994), logistic regression (Bahadır, 2013; Campbell Hunt, 2000; Güneri & Apaydın, 2004) and decision tree (Altaş & Gülpınar, 2012; Ersöz, Özseven & Ersöz, 2017). In literature, it has suggested that statistical methods can be compared with the ANN as well the ANN estimates obtained in different software. In this study the same data were analyzed by utilizing the ANN approach in difference statistical softwares as MATLAB and SPSS. Then, results of the predictions about academic achievement were evaluated. Lastly, the strength and direction of relationship among variable were compared with each other.

As highlighted in the literature some studies have utilized the ANN as research methods in educational research; however, studies examining the variables related to students' academic achievement at the primary school level are quite limited. In addition, studies have mostly compared academic achievement prediction by utilizing Logistic Regression Analysis (LRA) or decision tree methods with the ANN. Comparing the prediction of the ANN on academic achievement run in MATLAB and SPSS could be beneficial to determine which one could make stronger predictions. In this view, our study addresses the gap in literature comparing two different powerful analysis softwares by uisng the same method.

1.2. Need for Study

In the literature many methods and techniques were used to predict students' academic achievement enrolled in different educational institutions across the world. However, we have not come across any study that compares the academic achievement predictions of primary school students with the utilization of two different programs by using ANN analysis, which is the most reliable prediction mechanism of the information age and that works like the human brain. Using the ANN analysis, the main objective of this research was to compare parameter of variables affecting academic achievement in MATLAB and SPSS.

1.3. Hypothesizes

Hypothesis 1. The data collection tool developed by researchers are valid and reliable.

In literature, "father's education status", "mother's education status" and "father's employment status" (Anıl, 2009; Cameron & Heckman, 2001; Levpušcek, Zupancic & Socan, 2012; Ural & Çınar, 2014), "having the internet connection", "having a computer", "having a study room", "having a study desk", "having a library" (TIMMS, 2011) were found to be significantly related to student academic achievement. The first hypothesis of the study is test that data collection tool that included the aforementioned variable are valid and reliable.

Hypothesis 2. The model using the ANN in MATLAB software has classified students' achievements to a high degree.

In the literature, studies utilizing the ANN models in MATLAB software have reported to classify students' academic achievement to a high degree (Atasayar, 2019; Bahadır, 2013; Özkan, 2019). In this view, it is expected that the second hypothesis of this research is to test whether the model classifies student achievement to a high degree.

Hypothesis 3. The model constructed by ANN in SPSS classifies students' achievements to a high degree.

Studies have reported that the ANN model run in the SPSS software highly accurately classifies the academic achievement prediction (Lye et al. 2010; Luft, Gomes, Priori & Takase, 2013; Musso, Kyndt, Cascallar & Dochy, 2013; Tepehan, 2011; Turhan, Kurt & Engin, 2013; Wongkhamdi & Serensangtakul, 2010). The third hypothesis is to test the ANN model run in SPSS classifies students' achievements to a high degree.

Hypothesis 4. The magnitudes of the parameters obtained in MATLAB and SPSS are close to each other.

In the literature we haven't located any study comparing the parameters obtained in the MATLAB and SPSS softwares. However, some studies used these two softwares simultaneously (Bahadır, 2016; Demir, 2015; Yorgancı and Işık, 2019) and others compared the parameters obtained in SPSS and WECA softwares (Altaş and Gülpınar, 2012; Cortez & Silva, 2008; Özbay, 2015). The same token, it is hypothesized that the magnitudes of the parameters obtained in MATLAB and SPSS softwares are close to each other.

2. Methodology

2.1. Research model and participants

In this study a quantitative survey and correlational research model was used. Correlational research models are research approaches to examine the relation between variables whereas in survey models, the event, individual or object that is the subject of the research is tried to be defined within its own conditions and as it is (Karasar, 2010). A total of 465 fourth grade students who enrolled in primary schools located in Central Anatolia in Turkey participated in

this study in 2017. The sample in this location reflects the cultural and racial diversity of Turkey. The demographic information of the participants was displayed in Table 1.

Table 1. *Demographic information about participants*

Independent variables	Group	f (frequency)	% (percent)
Gender	Female	248	%53.3
	Male	217	% 46.7
Academic achievement status at end of third grade	Successful	459	% 98.7
	Unsuccessful	6	% 1.3

As seen in Table 1, approximately 53.3% of the participants in the study were girls and 46.7% were boys. Additionally, nearly 98.7% were successful at the end of third grade and 1.3% were unsuccessful. At the third grade students in Turkey were graded into three types of achievement status as "needs improvement", "good" and "very good". Within the scope of the research, those who were graded good and very good were put into the successful group and those who were evaluated as needs improvement were into the unsuccessful group.

2.3. Instrument

An achievement test developed by researchers were used as the data collection tool. In preparing the achievement test, first, a question pool was created with 35 questions created by the researchers. The number of questions was reduced to 23 items after consulting experts in a science, two mathematics, a measurement and evaluation, and two primary teaching fields. These 12 questions were removed either because they did not meet the language and measurement criteria. By doing so, the content validity of the questionnaire was met. An item factor analysis was performed for the construct validity of the 23 items. In order to analyze the factor, firstly KMO value was calculated and Barlett test was performed. The KMO value of the study was .62, Bartlett's test value was .00. Additionally, the KR20 value was .60.

2.4. Data analysis

After the validity and reliability of the data collection tool were established, data were analyzed with in MATLAB R2016a and SPSS 24.0 software. In the study, the third grade end-of-year achievement status of 4th grade students were determined as the output variable for ANN. A two-category discontinuous variable was created as "unsuccessful" (0) and "successful" (1). The aforementioned variables were considered as input. The ANN models tested in MATLAB R2016a and SPSS 24.0 software were performed to predict the students' academic achievement. Parameters found in analyses of the ANN in MATLAB and SPSS software were compared based on their regression coefficient.

3. Findings

In this part of the study, findings related to the hypotheses were presented.

3.1. Findings related to the Hypothesis 1.

To validate the instrument, an exploratory factor analysis was run. In order to run factor analysis of the instrument consisting of 23 items, it is suggested that KMO value should be higher than .60 cutoff value (Pallant, 2007). Addition to this, cutoff value of factor loading should be higher than .30. Therefore, 11 items not meeting this criterion were deleted. Varimax rotation was utilized. A new exploratory factor analysis resulted with three factors of twelve items. The factor distributions and loadings were presented in Table 2.

Table 2. *Factor loadings of the items based varimax rotation*

Items	Factor loadings		
	F1	F2	F3
Q3. Having a study room	.359		
Q4. Having a study desk	.630		
Q5. Having a personal computer	.727		
Q6. Having the Internet connection at home	.639		
Q7. Having a library	.669		
Q8. Developing self-study habit			.432
S12 In-class activities and experimenting			.739
S15.Teachers teach with different methods in class			.686
S16. Using technological tools in the classroom			.539
S17.Mother educational status		.869	
S18.Father educational status		.840	
S20. Father working status		.455	

The factor loading distributions of items ranged between .359 and .869. In the literature it is suggested that the factor loadings value should be over .30 and the difference between the two high loading values should be at least .10 (Çokluk, Şekercioğlu & Büyüköztürk, 2010).

The first factor in exploratory factor analysis included a total of 5 items and its factor loading values varied between .35 and .72. This factor explained 18.987% of the total variance. The second factor emerged from items consisted of 4 items and the factor loading values varied between .43 and .73. The second factor explained 13.562% of the total variance. The third factor included 3 items and factor loading values varied between .45 and .86. This factor explained 11.768% of the total variance. The three-factor structure explained 44.317% of the total variance. Considering items and experts' views, the factors were named as "student features", "teacher-school features" and "parental features", respectively. The KR20 reliability of the questionnaire, which consists of 3 sub-dimensions and 12 items, was recomputed and found to be .89. These findings indicated that the data collection tool was valid and reliable.

3.2. Findings related to the second hypothesis

In the analysis in MATLAB software, Levenberg-Marquardt (trainLM) algorithm was used in the training of feed forward-back propagation network. A three-layer feed forward-network as the input, hidden and output layers was used. In the hidden layer the sigmoid and in the output layer the linear activation function was used. In the academic achievement prediction model, there were 12 inputs in the input layer, 15 neurons and 1 output in the hidden layer (Figure 1).
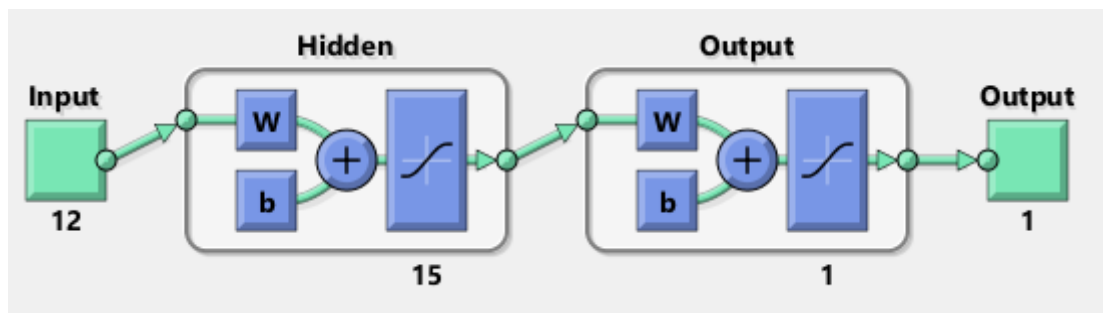
Figure 3. The layer, input and output layers of the model in MATLAB

Of the data set, 70% (325) in the training, 15% (70) in the verification and 15% (70) in the test were used. The ratios of the training, the verification and the test for modeling were showed in Table 3.

Table 3. *The classification based on results of the ANN model in MATLAB*

ANN steps	Observed	Predicted		Correct prediction percentage (%)
		Successful	Unsuccessful	
Training	Successful	274	43	86.4
	Unsuccessful	3	5	62.5
	Total	%98.9	%10.4	85.8
Verification	Successful	57	13	81.4
	Unsuccessful	0	0	0
	Total	%100	%0	98.6
Test	Successful	56	12	82.4
	Unsuccessful	1	1	50
	Total	%98.2	%7.7	81.4

As seen in Table 3, 317 out of 325 individuals were classified as successful and 8 as unsuccessful, and the correct classification rate was 86.4%. Of the 8 students who failed, 5 were correctly classified and 3 were incorrectly, and the correct classification rate was 62.5%. Of the 70 individuals who participated in the verification analysis, 57 successful students were correctly classified and 13 students were incorrectly. The correct classification rate of the verification analysis was 81.4%. Of the 70 individuals in the test step, 56 of 68 successful students were correctly classified and 12 were incorrectly. The correct classification rate was 82.4%. Of the 2 students who failed, 1 was incorrectly classified and 1 was correctly, and the correct classification rate was 50%. The total correct classification rate was computed as 81.4%.

Table 4. *The overall results of ANN analysis in MATLAB*

Observed	Predicted	Correct prediction percentage (%)
Successful	393	85.1
Unsuccessful	72	60
Total	465	84.5

As seen in Table 4, the total correct estimation percentage for the overall study was 84.5%.

3.3. Findings related to the third hypothesis

In analysis of the ANN model in the SPSS 24.0, Multilayer Sensor (MLR- Multiplayer Perceptron) was used. Whereas the "Hyperbolic Tangent Function" was used as the activation function of the artificial nerve cells in the input layer, the "Softmax Function" was used in the output layer. All variables were equalized to make sure that the model constructed was the same as MATLAB. There were 12 inputs in the input layer of the model, 15 neurons and 1 output in the hidden layer.

70% (325) of the data set were used in the training, 15% (70) in the verification and 15% (70) in the test. The training, verification and testing rates for modeling were displayed in Table 5.

Table 5. *The classification based on results of the ANN model in SPSS*

ANN steps	Observed	Predicted		Correct prediction percentage (%)
		Successful	Unsuccessful	
Training	Successful	265	56	82.5
	Unsuccessful	4	0	0
	Total	%98.5	%0	84.9
Verification	Successful	53	2	96.3
	Unsuccessful	15	0	0.0
	Total	%77.9	%0	75.7
Test	Successful	61	4	93.8
	Unsuccessful	5	0	0
	Total	%92.4	%0	87.1

As seen in Table 5, in the academic achievement prediction, there were a total of 321 students of 265 students who were successful. The correct classification rate was 82.5%. ,And 56 were incorrectly. Of the 4 students who were unsuccessful, all of them were misclassified. The correct classification rate was 0%. The total correct classification rate was 84.9%. There were a total of 70 students of 53 students who were successful. Of the 70 individuals included in the test, 53 of 55 successful students were correctly classified and 2 were incorrectly. The correct classification rate was 96.3%. Of the 15 students who were unsuccessful, all of them were misclassified. 15 students who were unsuccessful were incorrectly classified and the correct classification rate was 0%. The total correct classification rate was 98.6%. Of the 70 individuals included in the test, 61 of 6 successful students were correctly classified and 4 were incorrectly. The correct classification rate was 93.8%. Five students who were unsuccessful were classified incorrectly and the correct classification rate was 0%. Total correct classification rate was 87.1%.

Table 6. *The overall ANN analysis results in SPSS*

Observed	Predicted	Correct prediction percentage (%)
Successful	379	85.9
Unsuccessful	86	27.9
Total	465	81.5

As seen in Table 6, the overall correct prediction percentage of the ANN model was 81.5%.

3. 4. Findings related to the fourth hypothesis

The regression coefficient of a predictor or input variable shows the contribution of each of the variables on the prediction of the dependent variable. In order to quantify the relative importance of independent variables in predicting the output variable for the neural network, the proposed method for the MATLAB are a brief description of the connection weights algorithm (Olden & Jackson, 2002). Connection weights algorithm was used for relative

importance of independent variables. The relative importance of a given input variable can be defined as:

RI$_x$=, $\sum_{y=1}^{m}$ Wxy Wyz

RI$_x$ is the relative importance of input neuron x and $\sum_{y=1}^{m}$ Wxy Wyz is the sum of product of final weights of the connection from input neuron to hidden neurons with connection from hidden neurons to output neuron. y is the total number of hidden neurons, and z is output neurons. This approach is based on estimates of network final weights obtained by training the network (See Table 7).

Table 7. *Final connection weights*

Inputs	hidden1	hidden2	hidden3	hidden4	hidden5	hidden6	hidden7	hidden8	hidden9	hidden10	hidden11	hidden12	hidden13	hidden14	hidden15
W.room	0.26	0.36	0.27	0.11	0.45	0.11	0.71	0.76	0.84	0.12	1.05	-0.27	-0.07	-0.61	0.01
W.table	0.98	0.75	1.42	1.25	0.21	0.35	0.88	1.06	0.27	0.29	0.86	-0.66	-0.34	-1.31	-0.82
Comptr	0.27	0.62	0.90	0.45	0.15	0.46	0.07	0.88	0.36	0.14	0.03	-1.24	-0.60	-0.30	-1.13
Internet	0.75	0.13	0.50	1.49	0.51	0.16	1.50	0.20	1.22	0.99	0.59	-0.46	-1.51	-0.64	-0.63
Bookcse	0.20	0.05	0.36	0.33	0.17	0.50	0.50	0.39	0.48	0.81	0.13	-0.51	-0.27	-0.68	-0.78
R.work	0.55	0.51	0.49	1.50	0.61	1.06	1.27	0.08	0.97	0.35	0.48	-0.83	-0.01	-1.0	-0.36
Cl.activt	0.93	0.38	0.33	0.57	0.50	0.59	1.27	0.82	1.04	1.15	0.10	-0.77	-0.48	-1.10	-0.11
Df.meth	1.10	0.71	1.06	0.86	0.28	0.92	0.31	0.39	0.02	0.43	0.43	-0.44	-0.06	-1.03	-0.14
Technol	0.28	0.13	0.55	0.74	1.22	1.32	0.36	0.18	0.83	0.94	0.02	-1.04	-0.16	-0.11	-0.14
Moth.lit	1.22	1.23	0.49	0.55	0.09	1.19	0.27	0.86	0.15	0.84	1.10	-0.76	-0.16	-0.35	-0.18
Fath.litr	0.04	0.03	0.79	1.08	1.20	0.90	0.18	0.14	0.66	-0.54	0.36	-0.01	-0.43	-0.61	-0.42
Fa.work	0.80	0.82	0.35	0.05	0.70	1.26	2.25	0.46	1.37	-0.61	1.12	0.013	-0.23	-0.42	-0.39
GY	1.08	0.72	0.46	0.94	0.84	0.69	0.95	0.63	0.86	0.87	0.05	-0.86	-1.10	-1.26	-1.32

Table 8. *Connection weights products, relative importance and rank of inputs.*

Inputs	hidden1	hidden2	hidden3	hidden4	hidden5	hidden6	hidden7	hidden8	hidden9	hidden10	hidden11	hidden12	hidden13	hidden14	hidden15	Sum	R.Imp %	Rank
W.room	0.28	0.26	0.12	0.10	0.38	0.07	0.68	0.48	0.73	0.11	0.0	0.24	0.07	0.78	0.02	4.44	4.89	12
W.table	1.06	0.54	0.66	1.18	0.17	0.24	0.84	0.67	0.24	0.25	0.05	0.57	0.38	1.66	1.08	9.67	10.64	2
Comptr	0.29	0.45	0.42	0.43	0.12	0.32	0.06	0.56	0.31	0.13	0.00	1.07	0.66	0.38	1.49	6.76	7.44	8
Internet	0.82	0.09	0.23	1.40	0.43	0.11	1.44	0.13	1.05	0.87	0.03	0.39	1.67	0.81	0.83	10.37	11.41	1
Bookcse	0.21	0.040	0.17	0.31	0.15	0.35	0.47	0.24	0.42	0.70	0.00	0.44	0.30	0.86	1.03	5.76	6.34	11
R.work	0.59	0.37	0.23	1.41	0.51	0.74	1.21	0.05	0.84	0.31	0.0	0.72	0.01	1.28	0.48	8.82	9.71	4
Cl.activt	1.01	0.27	0.15	0.53	0.43	0.41	1.22	0.51	0.90	1.00	0.00	0.67	0.53	1.39	0.14	9.24	10.27	3
Df.meth	1.19	0.51	0.49	0.81	0.24	0.64	0.29	0.25	0.02	0.37	0.02	0.33	0.07	1.30	0.18	6.83	7.52	7
Technol	0.30	0.09	0.26	0.69	1.03	0.92	0.34	0.11	0.72	0.82	0.00	0.90	0.18	0.15	0.18	6.76	7.44	9
Moth.lit	1.32	0.89	0.22	0.52	0.07	0.83	0.2	0.54	0.13	0.73	0.06	0.66	0.18	0.44	0.24	7.17	7.89	6
Fath.litr	0.04	0.02	0.37	1.01	1.01	0.63	0.17	0.09	0.57	0.47	0.02	0.01	0.48	0.77	0.56	6.28	6.91	10
Fa.work	0.87	0.59	0.1	0.05	0.59	0.87	2.15	0.29	1.19	0.53	0.06	0.01	0.26	0.54	0.52	8.74	9.63	5
Sum	8.02	4.19	3.54	8.50	5.20	6.18	9.21	3.96	7.15	6.34	0.37	6.09	4.85	10.4	6.81	90.90		

As seen in Table 8, the order of the predictors influencing academic achievement to the most important to the least important; having internet connection at home (11.41%), having a study desk (10.64%), in-class activities and experimenting (10.27%), having self-study habit (9.71%), father's working status (9.63%), mother's education (7.89%) , Teachers teach with different methods in class (7.52%), having a personal computer (7.44%), the teacher teaches in the classroom with technological tools (7.44%), father's educational status (6.91%), having a library (6.34%) and having a study room (4.89%).

Since the SPSS automatically put the predictors in order of their importance, no formula was used. The result of the analysis in SPSS was displayed in Table 9.

Table 9. *Importance of predictors in the ANN analysis in SPSS*

Order of importance	Factors	Importance	Normalized importance percentage (%)
1	Having the internet connection at home	.15	100.0
2	Having a study desk	.14	94.5
3	Father educational status	.12	84.3
4	In-class activities and experimenting	.11	76.9
5	Developing self-study habit	.11	73.7
6	Using technological tools in the classroom	.09	64.9
7	Teachers teach with different methods in class	.09	61.0
8	Having a study room	.059	39.1
9	Mother educational status	.068	47.8
10	Having a personal computer	.032	21.5
11	Father working status	.030	20.0
12	Having a library	.023	15.3

The inputs / factors affecting to output/academic achievement were listed in the order of the importance in the ANN analysis in SPSS in Table 9. Results indicated that among the normalized inputs significant at the level of .01, the order from the most influential to the least was having internet connection at home (100%), having a study desk (94.5%), father's working status (84.3%), in-class activities and experimenting (76.9%), developing self-study habit (73.7), using technological tools in the classroom (64.9%), teachers teach with different methods in class (61.0%), having a study room (39.1%), mother's educational status (47.8%), having a personal computer (21.5%), father's educational status (20%) and having a library (15.3%).

The comparison of the orders of importance of the predictors found in both softwares was displayed Table 10.

Table 10. *Comparison of MATLAB and SPSS*

Importance	MATLAB ANN	SPSS ANN
1	Having the internet connection at home	Having the internet connection at home
2	Having a study desk	Having a study desk
3	In-class activities and experimenting	Father working status
4	Developing self-study habit	In-class activities and experimenting
5	Father working status	Developing self-study habit
6	Mother educational status	Using technological tools in the classroom
7	Teachers teach with different methods in class	Teachers teach with different methods in class
8	Having a personal computer	Having a study room
9	Using technological tools in the classroom	Mother educational status
10	Father educational status	Having a personal computer
11	Having a library	Father educational status
12	Having a study room	Having a library

4. Discussion

In this study, it was aimed to compare the predictions of the ANN in MATLAB and SPSS software and to determine the factors affecting academic achievement of primary school students. Participants were from schools located in Central Anatolia in Turkey. In the ANN model Multilayer Sensor Model was used in both softwares. 98% of the participants were successful at the previous academic year whereas %2 were not. The reason for the low rate of unsuccessful students is that, in the Turkish education system, the evaluation in primary school is oriented to promote to students to the upper class rather than grade repetition (Legal Gazette, 2014). However, some students with a really weak academic status can be considered unsuccessful and take a grade repetition with the consent of the parent.

In the light of the findings, the following conclusions were reached.

1. The measurement tool developed in determining the variables affecting the academic achievement set out in the first hypothesis of the research was confirmed as valid and reliable. Once the scope validity of the instrument was established by experts' opinions, the KMO value of the instruments was .62. Bartlett's test value of the instrument was .00. KR20 value was .89. 11 items were removed based on the result of factor analysis showed as their factor loadings were lower than .30 cutoff value. Remained 12 item explained 44.317% of the total variance. All these results indicated that the instrument was valid and reliable.

2. The second research hypothesis was related to whether the ANN model in MATLAB predicted the academic achievement with a high accuracy. The results showed that the model estimated the achievement accurately at high degree. The accuracy rate of the ANN model in MATLAB for the successful students was 85.1%, while the rate was 60.0 was for the

unsuccessful students. The overall accuracy rate for all students were 84.5%. The accuracy rate of the ANN model was higher for successful students than did for unsuccessful students. These findings were consistent with the previous studies that the ANN model predicted the achievement with high accuracy (Atasayar, 2019; Özkan, 2019; Yorgancı and Işık, 2019).

3. The third hypothesis was related to the ANN model tested in the SPSS with the multi-layered sensor estimated academic achievement of students with a high accuracy. It was found that the ANN model predicted the academic achievement status of 85.9% of successful students accurately. However, the model correctly predicted the academic achievement of 27.9% of unsuccessful students. Overall the correct estimating rate of ANN model estimation for academic achievement was 81.5%. Again, the rate of accurate estimation was higher for successful students than did for unsuccessful students. the findings were in parallel line with the previous studies in the literature (Çırak 2012; Luft, Gomes, Priori & Takase, 2013; Lye, et al., 2010; Musso, Kyndt, Cascallar & Dochy, 2013; Tepehan, 2011; Turhan, Kurt & Engin 2013; WongKhamdi & Serensangtakul, 2010). However, it was found that the accuracy rate of the ANN model was higher in MATLAB than did in SPSS. Especially, the correct estimation rate of SPSS for unsuccessful students was not at expected level; thus, it was more plausible to reject the third hypothesis.

4. The fourth hypothesis was found to be accepted. The results of the ANN model in MATLAB and SPSS showed that that the accuracy rate of the ANN model in MATLAB was higher than did in SPSS. Considering the findings, it can be suggested that the ANN model in MATLAB could compute a highly accurate prediction of students' academic achievement in the coming years than did in SPSS. These findings were consistent with the previous studies (Demir, 2015; Yorgancı & Işık, 2019). Therefore, because of higher accuracy rate at estimation, the ANN model in MATLAB was chosen to evaluate the importance of independent variables. However, the importance order of the variables affecting academic achievement in MATLAB and SPSS were quite close to each other. In both ANN models revealed that having internet connection at home and having a study desk were the strongest predictors of the academic achievement. These findings were consistent with the previous studies (Alamdar, 2015; Erbaş, 2005; TIMSS, 2011). The ANN model in MATLAB indicated that In-class activities and experimenting, using technological tools in the classroom, and teachers teach with different methods in class were found to be other most significant variables affecting the academic achievement. This result is consistent with the previous studies (Çalışkan, 2008; Şaşmazel, 2006). In addition, mother's educational status, father's educational status and father's employment status were significantly related to academic achievement. Some other previous studies have highlighted that these factors were significantly related to the achievement (Anıl, 2009; Ekmekyermezoğlu, 2010; Gelbal, 2008; Levpušcek, Zupancic & Socan, 2012). The high accuracy rate of the ANN model in MATLAB suggested that this analysis method and software can be an alternative method in the prediction studies in the field of education. Also, the findings suggest that the ANN model in MATLAB is a powerful tool that can be used in determining the factors affecting student academic achievement (Yagci & Çevik, 2019).

5. Implications and limitation

Although in this study the factors affecting academic achievement were measured with a valid and reliable measurement tool, these parameters are context-dependent which means that they change in the contexts of different countries, cultures, races or socioeconomic conditions. Therefore, considering the contexts of the study, reconstructing the factors affecting academic

achievement is very important. In this study, within the scope of the research, the ANN models in MATLAB and SPSS were chosen to predict academic achievement and their predictive powers were tested. In future studies, ANN methods in different statistical software may be preferred or comparisons can be made. In this study, primary school students' academic achievement was predicted. Therefore, the future research can be carried out at a wider range, at different grade levels and at different school types. In this study, it was found that factors including having internet at home and having a study desk were a powerful predictor of academic achievement; thus, it is necessary for every student or their parents to have internet at home and a study desk in order to increase their academic achievement at primary schools. Additionally, it can also be suggested that they should have a suitable study space of their own to create self-study atmosphere for their studies. Similarly, it was found that in-class activities and experimenting were found to be a predictor of academic achievement. Addition to this, self-study habit was another factor related to academic achievement. Therefore, these findings suggest that primary school teachers should help their students foster self-study habit and use different hands-on activities to improve their achievement. Results highlight importance of the usage of technological tool in classroom, that makes clear that primary teachers should promote to use technology in their classroom.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

Endnote

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A STUDY ON THE EXPERIENCES OF STUDENTS AND INSTRUCTORS IN BLENDED INSTRUCTION AND LEARNING IN AN ENGLISH PREPARATORY SCHOOL

Research article

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A STUDY ON THE EXPERIENCES OF STUDENTS AND INSTRUCTORS IN BLENDED INSTRUCTION AND LEARNING IN AN ENGLISH PREPARATORY SCHOOL

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Abstract

The aim of the study is to investigate the experiences of the students and instructors on blended language instruction and learning applied in an English Preparatory School in a state university. For this purpose, we have a mixed method, the explanatory sequential research design study. The participants were 400 students and 100 instructors. For data collection, both qualitative and quantitative research tools were used, and the data were collected through two questionnaires, one for students and the other for instructors to get the views of students and instructors with regards to blended learning. Additionally, for in-depth investigation, semi-structured interviews were conducted with both students and instructors. Our findings revealed that students had both positive and negative views towards the blended instruction/learning; some students reported that they were content with the idea but not the practice. On the other hand, the majority of instructors expressed positive opinions regarding the idea and the implementation of the blended instruction. While blended learning has the potential to reshape whole language teaching of the future, grounding this way of teaching onto contemporary pedagogical principles is critically important.

Keywords: blended learning, English preparatory program, preparatory students, instructors

1. Introduction

The search for optimal basis for language learning and teaching has always been a prior concern in English language teaching (ELT) context. For decades, developing better approaches and techniques has been the principal mission of applied linguists and researchers in this field. Richards & Rodgers (2001) point out that in the twentieth century, language teaching was characterized by frequent change and innovation. When it comes to contemporary pedagogy in ELT, there are considerably favourable tenets namely personalisation, authenticity, autonomy and differentiation which should not be separated from language teaching in any particular context. Hence, a teacher can face with students who have their individual learning preferences, different backgrounds, different priorities and reasons for learning a language in a language classroom. In such a case, creating appropriate tasks and conditions for learning becomes real challenge for teachers. In attempting to achieve an optimal learning environment, teachers have a number of resources and tools available. Blending right

sources and tools with right students and in the right time is the challenge of a language teacher. According to Marsh (2012), in order to implement blended learning effectively, it is essential that one should make the most of the learning opportunities and tools available for the purpose of achieving the optimal learning environment. Considering technological developments in the 21st century, it is evident that pedagogical innovations go towards that direction. Nowadays, new students start universities as technologically competent as they are "digital natives" (Prensky, 2001). Thus, many institutions are required to cater for the needs of new generations by embracing the new technologies.

When the integration of technology into instruction is necessary, educators, without doubt, tend to possess this innovation immediately. However, it has never been as simple as that. In such cases, appropriate blend, teacher and student trainings, assessment, and technological literacy have become initial concerns of institutions to run blended instruction smoothly. The integration of technology in foreign language instruction has become the prior action plan for better education in many institutions. According to Oh & Park, (2009), blended instruction has become a common delivery format in most universities, however, in order to evaluate blended instruction, appropriate procedures or instruments were minimal in most universities. The picture is not much different in Turkish higher education context. Mostly with the tools generated by publishers, many institutions have started integrating their instruction with technology. With the help of network-mediated educational software, institutions have also extended their scope via distance learning. Numerous surveys and research have been conducted recently in this respect. In particular, Bilgin, (2013) carried out an experimental study, of which results revealed that the experiment class outperformed control class. Moreover, the results of the students' questionnaire indicated that nearly all of the students considered online tool as useful. In addition, Ugur, Akkoyunlu & Kurbanoglu (2011) conducted a study with 31 graduate students to examine their views on the blended learning instruction and its use in relation to the students' individual learning styles. The results showed that students had a highly positive opinion on the blended learning instruction. The two studies mentioned above basically illustrate the reflection of blended learning in Turkish higher education. However, the studies were not in the context of ELT. In order to get a much clearer picture of the case in an EFL context, this study was conducted. Hence, this study has attempted to find out the experiences and attitudes of students and instructors to one-academic year blended learning English course and its effectiveness.

1.1. Literature Review

Recent learning theories and contemporary methodologies have always put learners in the center of teaching-learning environment. In that, teachers are required to create zones where they do the teaching and facilitates learning at the same time. In this respect, blended learning is considered as a tool to enrich learning opportunities. Osguthorpe & Graham (2003) identified six reasons why institutions should adopt blended learning: (1) pedagogical richness, (2) access to knowledge, (3) social interaction, (4) personal agency, (5) cost effectiveness, and (6) ease of revision. The strength of blended learning lies in its flexibility and its pedagogical effectiveness. Since it fosters mutual interaction and enhances active learning opportunities (Aycock, Garnham, & Kaleta, 2002; Riffell & Sibley, 2003; Waddoups & Howell, 2002; Garrison & Kanuka, 2004; Akkoyunlu, & Soylu, (2008a). Supporting this idea, Collopy & Arnold (2009) pointed out that "this flexibility provides students the personalized time they need to read, think, process and respond" (p.86). With respect to its connection to 21th century skills, blended English instruction has positive effect on students' critical thinking skills (Yang, et al., 2013, Garrison & Kanuka, 2004.) Similarly, King (2002) reported that online discussions prompted "critical thinking, dynamic interactive dialogue, and substantial peer-to-peer

interaction… depth of insight and response, that is, many times not possible in the face-to-face classroom because of time constraints" (p. 237).

In terms of language skills, Garrison & Kanuka (2004) state that "a concomitant property of learning with internet communication technology is that it has a significant educational implication resulting from the emphasis on written communication" (p. 97). Additionally, blended learning has positive effect on students' performances, increases students' participation in class and their motivation (López-Pérez et al., 2012; Liu, 2013; Hughes, 2007). For many, on the other hand, blended learning could be just an integration of online platform where you can keep multimedia materials to use in language class. From that standpoint, Delialioglu & Yıldırım (2008) simply summarize its effectiveness that thanks to a carefully designed and well implemented online instruction, students can have an access to more information faster, and they can have an opportunity to use multimedia environments to understand the content and improve their learning skills.

Is technology a magical tool to facilitate learning or is it a modern zone where we will place the education? This is one of the biggest confusion that teachers and course designers can be faced with. In this sense, McCarthy (2016) suggests that decision on the design of blended learning should be "pedagogy-led rather than technology-led" (p.3). Similarly, Moskal et al. (2013) argue that successful blended instruction has to correspond with the institutional, faculty and student goals. Additionally, Moskal et al. (2013) emphasize that there is no "one-size-fits-all approach" (p.16) which lead to success, however, it is achieved through continuous effort over a span of several years. Therefore, blended instruction should line up with all variations in learning, most importantly with SLA practices.

To investigate the application of the blended learning in an EFL context from the point of learners and instructors, this study sought to find out answers to the following research questions:

(1) What are the learners' experiences and attitudes towards blended learning instruction?
   a. In what ways do the students think blended instruction and learning helped them improve their various language competencies, skills?
   b. What are the advantages and drawbacks in the application of blended instruction and learning?
(2) Is there a difference regarding attitudes of genders in blended learning instruction?
(3) What are the instructors' experiences and attitudes towards blended learning instruction and learning?

2. Methodology

The study was conducted through a mixed method, the explanatory sequential research design (Cresswell & Plano-Clark, 2011). The data were collected through questionnaires and semi-structured interviews.

2.1. The Context of the Research

The context for this study is an intensive English program in the school of foreign languages in a state university in Turkey. The school provides intensive language classes to students who have registered to a department in the university where the medium of instruction is English. Provided that the students do not meet the English language proficiency requirements, they take one-year compulsory English preparatory class in various language levels; A1, A2, B1 and B1+ (CEFR, 2019). Hence, this study was conducted in foreign language teaching and higher education context as the blended learning instruction was practiced for the first time in this institution. English preparatory class is a typical EFL (English as a foreign language) context and has representative function for other universities in the country.

The school of foreign languages used a series textbook for its main course. Additionally, the institution blended their instruction with online components of the publisher. Students used their printed textbooks in class and signed in the online platform outside the classroom for practice and revision purposes. Students' performance in online platform was checked by class teachers and used as an added value for their final grades. Once students signed up for the online workbook, they were able to start the exercises right away. The instructors were required to sign up for the system to check their students' progress and provide feedback to them.

The online platform of was based on recursive practice of language skills except speaking. In listening, video and reading sections, students were able to do the exercises contextualised with some images and videos. However, the tasks in these sections were limited with recognition type of activities such as matching, true/false, multiple choice and gap-filling. Moreover, all activities were given in the same repetitive style in each unit repetitively. Besides, all activities were based on 'finding the correct option' and allowed almost no interaction among teachers and students. In writing sections, just like in-class training, students were able to submit their written work online and got feedback. For the lower levels, platform comprised activities which required students to write simple words and sentences in the given blanks. In upper levels, students were given more complex tasks in which students produced a structured text and submitted to their teachers. Teachers were only able to see these written works when they logged in. However, no instant notification was given to teachers and students. Additionally, teachers were not able to give detailed code-based feedback. System allowed them to give only verbal feedback and a score. As for the grammar and vocabulary section, students were able to practice newly learnt subjects and words with multiple choice, true/false, matching and gap-filling activities. These activities were very much similar to the ones that students did with the paper-based worksheets in class.

2.2. The Participants

The participants of the study consisted of students attending English preparatory class and their instructors. As student participants, there were 400 students whose age span ranged from 18 to 22. All the participants were randomly chosen from four levels (A1, A2, B1, B1+) and equally. Additionally, 100 instructors who taught English to the students throughout the academic year contributed to the study. The instructors had various teaching experience from 3 to 15 years and above, and some of them had MA degrees in ELT. The online system was introduced to the instructors for the purpose of orientation before the fall term began.

2.3. The Data collection tools

2.3.1. Questionnaires

In order to examine the participants' views regarding blended learning instruction, two questionnaires (one for students and the other for instructors) were used at the end of academic year. These questionnaires, adapted from Akkoyunlu and Soylu (2008b), were originally designed to understand the perceptions of students and instructors in blended learning instruction. The original blended learning scale consisted of 50 items under two categories. The first category, which included 35 items, was based on the learners' views on the implementation of blended leaning within sub-categories as; (a) ease of use for web environment, (b) online environment, (c) content, (d) face-to-face sessions, (e) assessment concerning content. The second category including 15 items was based on learner's views on blended learning in general. All items in the original questionnaire were developed as ten-point Likert type format. The questionnaires were slightly modified to fit blended learning format of the institution and for the purpose of the study. The students' questionnaire had 52 five-point-items (I strongly disagree / I disagree /I partially agree/ I agree/ I strongly agree) that focused on the perceptions of blended learning and its implementation process under 4

categories as; (a) online platform, (b) face-to-face sessions, (c) assessment, (d) learners' views on blended learning in general. Besides, the questionnaire developed for instructors had 13 five-point- items (I strongly disagree/ I disagree /I partially agree/ I agree/ I strongly agree) that only focused on instructors' views on blended learning. In order to establish its content validity, the final form of the questionnaires was examined by experts in the field and some minor adjustments were done considering experts' views. The reliability of the final forms of the questionnaires were calculated by using Cronbach alpha and was found as .90 for students and .89 for instructors which are satisfactory reliability levels. The students completed the questionnaire during their class hours. The instructors were given a week to complete and submit it. The participants were asked to rate each item on a scale ranging from 'strongly disagree (1)' to 'strongly agree (5).'

2.3.2. Interviews

In order to triangulate the findings of surveys and for further in-debt analysis of participants' views, semi-structured interviews were conducted with students and instructors in the final week of the term, regarding their views about the blended learning environment in their institution. Initially, the researchers wrote a number of interview questions based on related literature and expert consultations. After some adjustments, 8 interview questions for students and 10 questions for instructors were chosen. Research questions were prepared in English. However, for the sake of the reliability of the survey, all interviews were conducted in participants' native language and were audio recorded.

2.4. The Data Analysis

The data collected were computed and descriptive analysis was presented. In addition, in order to find out whether there was a gender difference in blended learning the independent t-test was applied. Each research question was discussed separately in the light of the findings gathered from representative questionnaire items. The scores obtained from both questionnaires were ranked as follows: "1.00-1.80: Strongly Disagree", "1.81-2.60: Disagree", "2.61-3.40: Partially Agree", "3.41-4.20: Agree", "4.21-5.00: Strongly Agree." Each research question was discussed separately in the light of the findings gathered from representative items. On the other hand, interview recordings were transcribed by two researchers and coded into several categories separately, and emerging themes were agreed in terms of content analysis.

3. Results and discussion

3.1.1. The students' views on blended learning instruction

Our data indicated that students partially agreed with the use of blended instruction (M= 3.02; SD= .55) in general. When we analyse the results of the questionnaire in terms of subcategories as (a) online platform, (b) face-to-face Instruction, (c) assessment, (d) general views on blended learning, we can see their views on these subcategories in detail (see Table 2).

Table 1. Students' views on blended learning

Items on	$\bar{x}$	SD
Face-to-Face Instruction	3.91	.70
Assessment	3.01	.71
Online Platform	2.68	.76
General Views	2.42	.81

N=400

Majority of the students still favoured having face to face instruction in the classroom (M=3.91; SD=.70). They partially agreed that assessment activities and tasks were useful to some extent as a blended instruction (M=3.01; SD =.71). On the other hand, they were not completely happy with the online platform (M=2.68; SD =.76), and therefore, their rating was low (M=2.42; SD =.81), which justifies that the online tool used seems to be regarded as ineffective. This was also indicated in the following interview extracts with students. In fact, most students were happy with the idea but they found some problems in practice. For example, students 2 and 5 stated as follows:

- I think the idea is fine but the implication is rubbish. Especially, I really want to talk about how inadequate the system is in term of technical features. I still – we have almost finished the first term- couldn't enrol in online class. Online platform doesn't help me practice, it gives me trouble. (S2)
- I think blended learning is good as an idea but in terms of implication, it is not sufficient I think. On the other hand, I think it also has complementary function. You can revise the things you missed in class. (S5)

Similarly, student 12 expressed dissatisfaction about practice and mentioned the pitfalls of the tool.
- Blended learning is theoretically fine. We are used to face-to-face instruction but in practice it has many pitfalls. I think, as it is used for the first time in the institution, it is not very well developed. It is not very appealing for students because it is not interactive and after a certain time, we can be fed up with and get bored of filling the gaps on the screen. (S12)

The design of the online tool was not favourable for some students. For example, students 1 and 15 stated:

- I think blended learning format could be more effective. In this way, we (are) kind of get bored and it seems like a burden to us. (S1)

- I enjoyed this language program here very much, specifically our discussion based lessons. But, the only thing I don't like is the online activities. They are more like boring homework which I find useless. (S15)

Student 13 expressed his desire to have more paper based exercises instead of online practice as follows:

- If there was no online platform and we had more paper based exercises instead, it would be easy for us to develop our proficiency. Online platform was a waste of time at all". (S13)

On the other hand, student 14 explained the causes of the problems reasonably as shown in the following extract:
- In general, it is ok, but there are things to be developed. It is a new model in this institution, maybe, that's why, there are some problems with it. (S14)

   Although the majority of the previous studies on blended language learning shows that there is a consensus on the positive effect of blended learning, our findings are not in correlation with previous ones (Al-Jarf, 2005; Hui, Hu, Clark, Tam & Milton, 2007; Borau, Ullrich, Feng & Shen, 2009; Comas-Quinn, Mar Domingo & Valentine, 2009; Jia, Chen, Ding & Ruan, 2012; Bueno-Alastuey & López Pérez, 2014; Arslan & Şahin-Kızıl, 2010; Kırkgöz, 2011; Caner, 2009; Baturay, Daloğlu & Yıldırım, 2010; Bilgin, 2013). The contrast between this study and previous ones may be explained in various ways, and it would be unfair to say that

students were not content with blended learning at all. As it was the first time for the majority of students to have an integrated online study into their education, their unfamiliarity with this new form of learning may have affected their success or motivation negatively. In addition, despite the intense contact of this generation with technology and their surprising expertise, technical issues and system related errors may have caused this dissatisfaction. Considering the neutral overall attitudes of students towards blended learning and positive interview extracts, blended instruction seems to be regarded as a useful way rather than frivolous efforts, yet it needs some adjustment and revision.

In contrast with the negative views, some students had positive views about blended learning and stated their positive opinions during the interviews. For example, students 3, 5 and 8 expressed their contentment about listening practice as follows:

- I am personally happy with blended learning but I think listening audios should be more difficult on the online platform because during the listening exam, what we listen to is much more difficult. But I am generally positive to this blended learning. (S3)

- At the beginning of the year, I almost have no listening skills but with the help of this online platform, I feel like I can understand more. I think it was definitely useful for my listening skill. But, online system has no contribution to my speaking skills. (S5)

- "Listening, all audios are uploaded to the system and I can listen to a topic many times with even scripts. By this way, I always understand. This develops my listening skill. Reading parts is also one of my favourites because they are very rich in terms of content and visual design. (S8)

As for the vocabulary development, students 3 and 11 found online tool useful and stated their satisfaction as follows:
- To be honest with you, I am content with the blended learning and online platform. It has some visual parts which helps me develop my vocabulary. In face-to-face instruction, we have opportunity to interact in English with our teachers. (S6)

- It is the first time I have tried such online platform for language learning, and I cannot say it is completely successful but it still has good sides. For example, it helped me to develop my vocabulary. (S11)

Student 8 also mentioned effectiveness of blended learning in terms of compensation as below:

- I am happy with this blended learning. Compared to my previous education, having online and face-to-face instruction complete each other". (S8)

All these quotations indicate that they found blended instruction useful to some extent, and they believed that it contributed to their learning English to some extent. It seems that students need more orientation and applications for the effective use of online tools. On the other hand, online program requires them to be autonomous as much as possible in their studies. However, our students begin the preparatory program after high school, and it seems that they are not autonomous enough to carry out activities and tasks regularly on their own in line with the face to face instruction. Palfreyman (2003) argues that being autonomous is a cultural phenomenon and mostly promoted in Western cultures. Implementation of such instruction may cause some difficulties in other cultures. According to Yumuk (2002), common way of teaching in Turkey is mainly based on memorisation and traditional teaching methods in which teachers are

regarded as the source and the students are the receiver of the knowledge. Therefore, pushing students into such learning environment which requires high level of autonomy may affect them negatively. As blended instruction has been used for the first time in the program, students and instructors may have had some adaptation problems.

The highest mean score in this survey (m=3.91) is for the 'face-to-face instruction.' Students' attitudes towards in-class learning can be considered as relatively positive. This result indicates the fact that students benefited and enjoyed from face-to-face classroom instruction more compared to online support. The following extracts from the interviews with students confirm that as follows:

- I think it (on line platform) is OK, but I prefer face-to-face instruction more because it is more effective and we can check our understanding and get feedback from our teachers immediately. (S3)

- I can say online system is not as successful as the face-to-face instruction. At least I feel that way. (S7)

- I am happy with the face-to-face instruction but online platform has some problems. I cannot say it is entirely useless but needs improvements. It could be better. This year, I cannot say it has very much positive effect on my English. (S10)

In this case, instructors should primarily be given the credit for this contentment. However, there are other issues which should be taken into account while considering this positive attitude. First, instructor's support in class and students' social interaction with the instructors and classmates may have made it easier for students to practice language. As they had gone through their previous education mostly in face-to-face settings, they may feel much closer and relaxed in this setting. On the other hand, individual online studies may have been a challenge for the students who have more interpersonal intelligent types and for the ones who are less autonomous. Hence, this increases the possibility to get lost in an individual online study and eventually be dropped off.

As for the final category, the mean score for the assessment was 3.05. Since this category had items for both online and face-to-face ways of learning, each item was analysed separately. Table 2 illustrates the mean scores for each item related to assessment in blended learning format.

Table 2. *Students' views on assessment in blended learning.*

Items	$\bar{x}$	SD
29. Mentoring about the tasks in face-to-face sessions help us a lot.	3.78	1.02
31. Quizzes and mid-term exams during the face to face sessions help me to understand what I have learned and reflect my progress.	3.43	1.13
28. Evaluation criteria in the online platform guide us in how and what to do in our tasks/exercises.	2.54	1.06
30. Evaluation criteria for the exercises in the online platform are clear and understandable.	2.46	1.10

N=400

Starting with the item 28. Evaluation criteria in the online platform guide us in how and what to do in our tasks/exercises (M=2.54, SD=1.06), we found that online tool in this blended format was not considered sufficient in terms of assessment. Similarly, when we look at the item 30. Evaluation criteria for the exercises in the online platform are clear and understandable

(M=2.46, SD=1.10), it justifies the fact that there is an evident discontentment about the evaluative function of online tool. Turning the other side of the blend, regarding face-to-face instruction, the item 29. Mentoring about the tasks in face-to-face sessions help us a lot (M=3.78, SD=1.02) - had the highest mean score in terms of assessment. Likewise, the item 31. Quizzes and mid-term exams during the face to face sessions help me to understand what I have learned and reflect my progress (M=3.43, SD=1.13) - on the basis of face-to-face assessment had the second highest mean score. The following extracts from the interviews with students confirm that as follows:

- Writing is definitely one of the disadvantages. We get no feedback at all from our teacher. We get feedback in class from our teacher but I can say that online platform doesn't help me practice all skills. (S6)

- Textbook and its online component are very simple. If it was more challenging, it could prepare us for our academic life better. (S5)

On these grounds, we can argue that in this blended learning mode, online tool is not favoured by the students in terms of assessment. However, the consensus view seems to be that students reflect the progress better during face-to-face instruction and benefit from direct oral feedback more. That is to say, students are more in favour of verbal in-person feedback rather than some numerical results they get from a software program.

In summary, the available evidence seems to suggest that the students see blended learning in this program as an effective plan with some consequential pitfalls. For the sake of the curriculum and the success of the program, further remedial changes are required. On these grounds, we can argue that blending online software with face-to-face instruction may sound to be an effective plan, however, creating right blend, that is developing fine online platform which suits students' needs and goals is always a real challenge.

3.1.2. What are the innovations brought by blended learning to the students' motivation and attitude in their language learning process?

The items below seek to disclose whether blended learning has changed students' understanding of language learning process and their motivation levels. As can be seen in Table 3, the related items (49 – 32 – 51 – 41) had mean scores below 3 and only the negative written item (34) - My motivation is very low while I am studying in the online platform (M = 3.43, SD = 1.30) - had higher mean score. These results provide confirmatory evidence that this blend had no positive contribution to students' motivation and did not change students' attitudes radically. In other words, there seems to be a unified objection against the idea that the blend was set to develop more autonomous and blended learners. Based on these results, it can be stated that the findings are broadly consistent with the major trends of the survey presented in Table 3. Students' views on their motivation levels and attitudes in blended learning.

Table 3. *Students' views on their motivation levels and attitudes in blended learning.*

Items	$\bar{x}$	SD
34. My motivation is very low while I am studying in the online platform.	3.54	1.30
49. Being able to practice through PC or mobile devices provides huge practicality.	2.48	1.16
32. Learning through website makes me responsible for the course.	2.36	1.16
51. Teaching program with online practice shifted my whole understanding of language learning and sparked my interest.	2.30	1.14
41. Studying in the online platform helps me make plans.	2.26	1.09

N=400

Following extracts show that students' negative ratings about motivation in the questionnaire were in correlation with the interview extracts.

- As for the drawbacks, I can only say that some exercises are very boring. (S8)

- Online platform is not interactive and it becomes boring after a certain time. (S11)

- It is just a boring workbook that was put online platform. (S12)

3.1.3. In what ways do the students think blended learning helped them improve their various language competencies, skills?

Contrary to overall trend of the survey findings, the results obtained from the questionnaire items regarding the language skills development in blended learning was slightly higher. Student's responses to these items were very close to each other and just slightly below 3. Their opinions about the effectiveness of online platform in teaching skills could be put somewhere between 'low' and 'medium'. The interesting point to state in this figure is that the item 14, which questions the writing skill development, had lower mean score than the other skills (Table 4). However, as an example of similar study, Arslan & Sahin-Kızıl (2010) suggest that technology integrated writing classes (blogs were used in their study) have potential to provide more effective writing instruction. Similarly, Adas & Bakır (2013) report that integrating blended learning into traditional methods in developing writing abilities has significant benefits. All in all, the data yielded by this figure provide convincing evidence that students are moderate in their views on the development of language skills.

Table 4. *Students' views on the development of language skills in blended learning.*

Items	$\bar{x}$	SD
17. Grammar practice in the online platform helps me develop my competency.	2.91	1.15
15. I can extend my vocabulary with exercises in the online platform.	2.91	1.10
13. Online Platform provides plenty of opportunities to practice my listening and reading skills.	2.90	1.22
16. Grammar practice in the online platform helps me satisfy my needs in learning English.	2.90	1.15
14. I can easily do writing assignments and submit to my teacher through online platform.	2.47	1.24

N=400

In line with survey findings, the analysis of interviews with students demonstrated that there were both positive and negative statements which argued that online platform was useful for particular skills. In the following extracts students 4, 5, 8 and 14 stated that in blended learning, online tool contributed to their listening, reading and vocabulary development as follows:

- I think I extended my vocabulary knowledge with online activities because it makes us use the same word in different activities repeatedly. Also, it helps me to develop listening skill but no other skills specifically. (S4)

- At the beginning of the year, I almost have no listening skills but with the help of this online platform, I feel like I can understand more. I think it was definitely useful for my listening skill. Online system has no contribution to my speaking skills. (S5)

- Listening, all audios are uploaded to the system and I can listen many times with even scripts. By this way, I always understand. This develops my listening skill. Reading parts is also one of my favourites because they are very rich in terms of content and visual design. (S8)

- Online platform listening activities are very useful for me. (S14)

On the other hand, some students underlined the advantage of having blended way of instruction. Students 1 and 3 stated that both face-to-face and online instruction helped them develop different skills as shown below:

- It is insufficient in terms of grammar development. I enjoy its vocabulary activities though. In addition, speaking is our essential skill to develop and it can only be developed during face-to-face classes. Therefore, there must me more face-to-face instruction. (S1)

- In the face-to-face instruction, I think my grammar and writing skills developed most. In class, we don't do listening very effectively, it is better to listen online individually. (S3)

With regards to skill development, for students 2, 7, 9, 11 and 12, online platform was not as efficient as the face-to-face instruction. These students declared that they developed their speaking, writing skills and grammar better with face-to-face instruction. This was stated in the following extracts:

- Face-to-face instruction develops our speaking ability, and also our thinking ability because the topics in our textbooks are controversial and we always think critically and discuss in classes. Maybe they are academic but at least social issues. (S2)

- Face-to-face instruction develops our writing and speaking skills but I think online system has no positive effect on my skills. Not at all. (S7)

- Online platform has little or no effect on my skill development. Especially in face-to-face instruction, we develop our speaking and writing skills a lot. (S9)

- I developed my speaking and writing skills with face-to-face instruction especially with our native speaker teachers but online platform has no specific effect on any particular skill. (S11)

- We practice all skills during face-to-face instruction. Online instruction has no significant effect on my language skills. If it was developed better, I think, it still would be insufficient for speaking skill. For that, face-to-face in person interaction is necessary. (S12)

In summary, on the basis of the evidence stated above, it seems fair to suggest that there is a consensus in terms of the effectiveness of face-to-face instruction for skills development. However, when it comes to online platform, students' opinions differ considerably. Although some positive views arose for some specific skills, in particular, listening skill and vocabulary development and reading skill, the online platform had little impact on students' skill development of productive skills such as speaking and writing.

3.1.4. The advantages of blended learning in learning English

This research question tried to disclose the advantages of blended learning perceived by learners in foreign language learning. The following extracts from the interviews with students demonstrated that students expressed various advantages. Students 1 and 13 found online tool advantageous in terms of skills and vocabulary practice. This was stated in the following extracts as follows:

- I think it has advantages for vocabulary development. Seeing same words on internet repeatedly helps us to memorize these words. (S1)

- It is good to have all skills practice in one place (S13)

In addition, majority of the participants agreed on the idea that online platform was a useful tool for practicing and revising. Students 3, 4, 5, 8, 10, 11 and 15 stated their opinions with regards to that as below:

- Online platform is like a homework. Every time I go home I have something to do to practice my English. Also it helps me to memorize the newly learnt vocabulary. (S3)

- It has helped to prepare for exams. For example, I only did the online activities before last monthly exam and I did well in the exam. Online activities help in terms of revising, memorising. (S4)

- Sometimes I don't enjoy some classes and I don't attend. But I can study the subjects I missed on my own via online system. (S5)

- It helps me to revise the missing parts of the lesson. If I miss a lesson, I can easily study at home and compensate. Additionally, it gives me opportunities to do reading and listening exercises. (S8)

- Only advantage is that it gives us chance to revise. And also I find listening parts a bit useful. (S10)

- Revising the words that we learned in class with the online platform is, I think, the biggest advantage. (S11)

- I think it has one advantage, we don't need extra material to study at home. It has everything online in one place. Apart from that, there is no other significant advantage that I can talk about. (S15)

Student 6 stressed the connection between his intelligent type and online tool. This was stated in the following extract as follows:

> I think I have visual intelligence and the online platform helps me to memorize words and I can do in the exams easily. Also, I also feel like it helps listening because by listening again and again, I started understanding better in class listening activities. (S6)

In the questionnaire, students' ratings regarding blended learning was partial agreement and online part of instruction was not appreciated as much as face-to-face classes. Nevertheless, interview extracts showed that students were content with certain parts of this blended instruction, and this way of instruction in this program could be considered as advantageous to some extent. With regards to advantages of blended learning, Collopy & Arnold (2009) stated that it provides flexible learning for students to personalise their own studies. Similarly, the common point of some extracts above is that some students emphasise the importance of being able to work alone in their own pace and style.

3.1.5. The drawbacks of blended learning in learning English

From the interviews with students, it can be seen that there are certain issues students found rather futile and inadequate. One of the problematic aspects of the blended instruction for students was the boring and non-interactive format of the online tool. Students 1, 8, 11 and 12 stated their opinions with regards to that as follows:

- Its very time consuming and you have to spend very long hours to complete activities. (S1)

- As for the drawbacks, I can only say that some exercises are very boring. (S8)

- Online platform is not interactive and it becomes boring after a certain time. (S11)

- It is just a boring workbook that was put online platform. (S12)

System related faults could be considered one of the main drawbacks of blended leaning as students 2, 10 and 14 stated this in the following extracts:

- The system is boring and it has some bugs. Students can easily find the correct answers without even trying. So it demotivates students. (S2)

- It has software related bugs. Students get 100 point without writing a word. I think program developers should have checked that before and took and precautions. (S10)

- There are lots of software related bugs and technical problems. This is very annoying, sometimes just because of a single comma our answers are not accepted by the system. (S14)

On the other hand, as for the writing practice, student 6 found online tool inefficient.

- Writing is definitely one of the disadvantages. We get no feedback at all from our teacher. We get feedback in class from our teacher but I can say that online platform doesn't help me practice all skills. (S6)

In terms of implication, students 3, 5, 9 and 15 found blended learning problematic for different reasons. These are stated in the following extracts.

- As for disadvantages, I think online system is not developed for students' skills. As every student learns in different pace and way, it doesn't suit everyone." (S3)

- Textbook and its online component are very simple. If it was more challenging, it could prepare us for our academic life better." (S5)

- With online studies I cannot develop myself, I get lost with them." (S9)

- I think online studies are waste of time. Students do them just to get scores. I wouldn't do them if they weren't compulsory and didn't have additional value on my final grade." (S15)

In any blended learning setting, some negative remarks are always expected and welcomed. These remarks are regarded as valuable feedback for the program's success. The interview extracts above regarding the drawbacks of the online tool should be taken into consideration seriously to refine the blend accurately. In a similar research, Bilgin (2013) found that although blended instruction contributed to students' performance considerably, they expressed discontentment for the reasons such as compulsory use of online materials and lack of print materials. Moreover, interview results of the research also showed that students valued print materials over online sources. Therefore, no matter how good the blend is, it seems that students tend to stick to their old learning habits and reject the new techniques which are imposed on them.

3.1.6. Gender difference regarding the attitudes of genders in blended learning instruction

In the present study, there were 212 male and 188 female participants. As shown in Table 6, the analysis of independent t-tests revealed that the difference between genders was significant for the categories 'Online Platform' and 'Face-to-face Instruction' ($p > .032$ / $p > .005$). The findings showed that female participants had higher mean scores for the related categories. That is to say, female participants were more in favour of the implication of the 'Online platform' and 'Face-to-face Instruction'. However, in regards to the categories of 'Assessment' and 'General Views', the results of independent t-tests indicated no statistically significant differences between genders ($p < .524$ / $p < .594$).

Table 6. *Differences of students' views in respect to gender*

	Male (212)		Female (188)			
	$\bar{x}$	SD	$\bar{x}$	SD	t	p
Online Platform	2.59	.76	2.76	.74	-2.15	.03
Face-to-Face Instruction	3.81	.72	4.01	.66	-2.79	.00
Assessment	3.03	.70	3.07	.72	-.63	.52
General Views	2.40	.80	2.44	.83	-.53	.59

N: 400

3.1.7. The instructors' views and attitudes towards blended learning instruction

The data gathered for this purpose suggest that the instructors compared to the students had more positive views of blended learning. The consensus view suggested that online platform in blended learning was a practical, innovative method for students to be more autonomous and to provide more input and individualized practice. Table 7 illustrates the mean scores for the instructors' responses to the items.

Table 7. *Instructors' views on blended learning*

Items	$\bar{x}$	SD
4. Students can study at their own pace with online platform.	4.07	.93
3. I believe that students can learn language effectively by integrating the materials in the class with the online platform.	4.02	1.08
1. Blended learning has positive impact on students.	3.94	.87
9. Being able to practice through PC or mobile devices provides huge practicality for students.	3.92	1.01
12. Blended learning helps learners develop receptive skills (Listening/Reading).	3.90	1.07
2. Blended learning makes students autonomous.	3.66	.93
7. Blended learning motivates students.	3.49	.96
11. Blended learning makes the course more communicative.	3.45	.92
8. Blended learning makes students responsible for the course.	3.27	1.08
13. Blended learning helps learners develop productive skills (Speaking/Writing).	3.19	.92
6. Modules in the online platform meet students' needs.	3.04	.87
5. Learning the contents through the online activities is easier for students than face-to-face instruction.	2.62	.98
10. I believe that students can learn English only through the printed materials.	2.11	.70
Average	3.61	.68

N=100

Although the overall mean score (M= 3.61, SD= .685) seemed to suggest that there was positive attitude towards blended learning, some outstanding items were worth pointing out. First of all, items 3 (M= 4.02, SD= 1.08), and 10 (M= 2.11, SD= .700) indicated that instructors considered online studies as a useful tool. However, the rating for the item 5 (M= 2.62, SD=

.982) showed that instructors considered face-to-face instruction as a primary medium and online studies as complementary. As for the views of instructors on the effectiveness of blended learning in teaching skills, items 12 (M= 3.90, SD= 1.07), and 13 (M= 3.19, SD= .928) indicated that blended instruction was efficient for receptive skills but not for productive skills that much.

Similarly, the instructors indicated during the interviews that they were mostly happy with the idea of blended learning, and believed that blended learning had positive effect on students' learning. The following extracts from the interviews with instructors reflected their ideas related to their perception of blended learning. With regards to language exposure, which is considered one of the most important tenets of language learning. One instructor stressed the positive effect of blended learning for the amount of exposure as shown in the following extract:

- In language learning, we always try to raise the amount of the exposure in terms of foreign language. I think the online platform, which students could access even with their mobile phones, makes them spend more time with English. I like it. (I8)

The following extracts show that instructors were content with the implementation of blended learning as it provided practice opportunities for listening skill, grammar and vocabulary.

- As our students are never willing to read outside the classroom, they generally fail to extend their vocabulary. But what I observed this year is, just because they practice the words they learnt in online platform, their written productions were better in terms of lexical richness. (I4)

- Our blended system at schools has many advantages. First, it gives grammatical and lexical practice to students. And, I find listening exercises very useful for them. (I2)

- We are living in a country where English is not spoken as a mother tongue. Therefore, students have less listening and speaking practice." "CDs cannot be their everyday regular study practice. But in this online platform, they can listen graded audios anytime. So this is very good. Also, the online activities are correlated with the textbook. Students can follow the course regularly on the platform. This makes them more organised and they don't fall behind the course. I wish we had had such opportunities when learning English. (I7)

- Vocabulary is the major problem of foreign language learners. One of the biggest advantages of this online platform is that it gives students various – mostly fun – vocabulary exercises. For example; puzzles, matching etc. (I8)

- In this century, I think every institution should integrate technology into their teaching. (I3)

Similarly, instructor (I10) put forward the positive contribution of online platform to students' motivation as stated below:

- I think blended learning and this Macmillan Online workbook make learners more motivated for the course. Today, it is really difficult to keep students motivated during class hours all the time. I think, online activities compensate this situation. Also, I think students benefited a lot from online vocabulary activities. (I10)

As for the practicality, two instructors (I2 and I9) expressed their opinions about how blended instruction made learning easier for students as follows:

- It is a platform worth trying. It has more advantages than disadvantages. It allows teachers to monitor their students' progress more closely than traditional methods. This way of learning is also very practical, and students can assess it anytime and anywhere. (…) I think blended learning boosted my students interest and engagement. (I9)

- I think technology always makes learning easy. Today with this practicality, one can learn a language in a very short time. (I2)

Turning the other side of the argument, some instructors (I2, I4, I5, I10),   – although they were happy with the idea of blended learning - expressed some problems and pitfalls about the implication of the blended instruction. The following extracts reflect instructors' opinions with regards to drawbacks of the blended instruction.

- Registration process was so long and painful. I think this demotivated the students at the beginning of the course. It should be simpler. Not everybody is expert in technology. (I2)

- I liked the idea and also the Macmillan Online Workbook. But it shouldn't have been compulsory for students because they just do it for grade not for self-development. (I5)

- The online platform is good but not enough. We shouldn't stop doing in-class grammar exercises. They learn better when we explain some points. As for listening, online platform is a must. (I10)

- I couldn't create my online class for a long time. There should be more technical help for some teachers. The online activities are good but the students always tell that they get bored. And online platform has nothing for speaking skill. (I5)

- The online platform is much simpler than I expected. It is full of some gap filling and matching exercises. I think it should be more interactive and more creative. (I4)

   In summary, these results provide some evidence that in this one-year blended language program, instructors were mostly content with both the idea and the implementation of blended format, and they held the view that student benefited from this way of learning considerably. However, according to some instructors, there are some important points that should be developed; technical difficulties, compulsory implication and null design of the platform are the major drawbacks. Additionally, the disparity between students and instructors is understandable as there may not be correspondence between what instructors wanted and what students actually needed. Supporting this issue, Moskal et al. (2013) point out that success of blended instruction depends heavily in accordance between institutional and student goals.

4. Conclusion and Implications

   The findings of the study provided detailed information about how teachers and students experienced teaching and learning in a blended learning environment. The data yielded by this study provided some strong evidence that students had some positive views as well as negative

towards blended learning English course. On the other hand, instructors expressed relatively positive opinions about the idea and the implementation of the blended instruction.

With regards to students' attitudes towards blended learning, the analysis of the questionnaires revealed that majority of the students found face-to-face instruction more effective than online studies. This could be explained with the students' readiness level for a blended instruction and adaptation. For students having only traditional face-to-face instruction in their previous education, they may not adjust themselves into new teaching model. To get better results, a new way of instruction should be piloted with small groups. Furthermore, interview scripts showed that students were in favour of the idea of blended learning but not satisfied with this implementation. In such cases, amendment of the online tool should be the first action plan since it plays the major role in the success of blended instruction. As for language skills, there was a consensus that online platform was an effective tool to practice listening and vocabulary. In this sense, questionnaire ratings and interview scripts are very much in line with each other.

Overall, revising opportunity, vocabulary/listening practice via online tool and its flexibility were considered as advantages. On the other hand, boring exercises, software related failures and non-interactive format of online platform were featured drawbacks of the blended learning. The analysis of the survey provides ample evidence that students were not very much motivated with the blended learning. Additionally, the analysis of the interviews indicated that some students (40%) considered online studies as a burden. Motivation level of students in blended instruction is strongly connected with students' overall language learning desire. Besides, institutional policies such as putting deadline for online studies and making them compulsory may have been negative factors for students' low motivation level.

In contrast with the views of the students, instructors had more positive attitudes towards blended learning. They pointed out that it was good and effective method for language learning. They also emphasized positive contribution of blended learning to vocabulary and listening skill development. However, some instructors expressed dissatisfaction related to the technical aspects of the online set up.

As for material design, the outstanding point is that for online platforms, interactive studies instead of some null workbook type of exercises are more favourable for students. Moreover, registration process and user friendly applications and continues maintenance and support are major factors for students' enthusiasm and success.

The results of the study were expected to give insights into blended learning with respect to foreign language learning. However, there were, admittedly, unavoidable limitations which made it difficult to generalise for other contexts. At first, the study was limited to two semesters of implementation process for blended foreign language learning in a preparatory program. It might give different results if it was implemented in a longer period of time. Second, the study was limited to the EFL context, and it might give different results if it was conducted in different contexts with more communicative online platforms and better orientation of both students and instructors.

Based on the results of this study, it is possible to suggest some recommendations for future research. First of all, although the findings of this study have representative function for similar EFL settings, this study should be replicated in different EFL settings. In addition, online components and the form of blended learning have numerous variations. Therefore, the perception of blended learning could be different in other settings because of the tool and participants. Another area that deserves attention in future research is the comparison of the perceptions of participants from different backgrounds, e.g. educational background of students such as rural-urban, level of language competence or various age groups. In addition, curriculum designers, program developers and administrative actors in an institution could be included in similar research.

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

7. Financial Disclosure:

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HOW DO SCHOOL TEACHERS IN TURKEY PERCEIVE AND USE THE CEFR?

Research Article

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HOW DO SCHOOL TEACHERS IN TURKEY PERCEIVE AND USE THE CEFR?

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Abstract

The Common European Framework of Reference (CEFR) is used in Turkey by teachers, administrators and researchers to support English language teaching and learning. This paper discusses the knowledge and use of the CEFR by a group of teachers. Eight teachers were interviewed about the CEFR and carried out an assessment task. Findings show that the teachers knew of the CEFR, had a positive view of its contribution to English Language teaching in Turkey, used CEFR-related practices such as self-assessment in class and could use CEFR tables to successfully assess sample performances. On the other hand, findings also show that the teachers had received little or no training about the CEFR, they had difficulty in applying the CEFR to their classroom assessment practices and they showed that they have only a vague idea of the CEFR proficiency levels for assessment. After reading CEFR tables they say that the language used in the CEFR is generally suitable for teachers to use, but they feel that the level of the language used in the English version of the tables is too high for their learners to benefit from.

Keywords: CEFR, school teachers, knowledge, experience

1. Introduction

The Common European Framework of Reference (CEFR) was developed through forty years of work by the Council of Europe and is now used all over the world along with changes in pedagogy, curricula and testing. The CEFR supports an 'action-oriented' approach (Europe, 2001, p. 9) to pedagogy and focuses on learners, teaching and testing as linked concepts (Faez, Majhanovich, Taylor, Smith, & Crowley, 2011) and promotes the use of self-assessment to develop learners' awareness of skills and knowledge. was developed by the Council of Europe, with the CEFR, aimed to to 'provide a common basis for the elaboration of language syllabuses, curriculum guidelines, examinations and textbooks across Europe' (Europe, 2001, p. 1). The CEFR describes language learning and the abilities required for learners to be effective, communicative users of a language. There is extensive use of 'Can Do Statements' for second language proficiency in five skills (reading, writing, listening, spoken production and spoken interaction) and six levels (C2, C1, B2, B1, A2, A1). The CEFR provides statements known as descriptors that describe what learners 'can do' at different levels, the focus is not on what learners cannot do. In this way, the CEFR aims to be practical and user-friendly. The influence of the CEFR on foreign language education is widespread in Europe and elsewhere in the world. The CEFR is used in a variety of ways in different contexts, and this study aims to contribute to our understanding of how school teachers understand and use the CEFR.

It has been two decades since the first introduction in Turkey of the CEFR and European Language Portfolio (ELP). Turkey stated its support for the goals and objectives of the

European Union (EU) for language education with the adoption of the CEFR as a reference document for foreign language teaching (Demirel, 2005). There were pilot projects that involved 20 schools in two towns in the academic year 2001-2002. Subsequently, the Ministry of National Education or *Milli Eğitim Bakanlığı* (MEB) extended the pilot projects to ten towns in total for the academic year 2006-2007 (Sahinkarakas, Yumru, & Inozu, 2009). However, further in-service training programmes in more schools for more teachers were not provided comprehensively in the years that followed. As a result, most teachers knowledge, understanding and experience of the CEFR is not clear. This study aims to look at the extent to which teachers are familiar with the CEFR and how they view the application of CEFR principles and practice.

The CEFR has influenced teachers' views on language teaching, testing and curriculum design in Turkey, and the MEB adapted its educational policy according to the CEFR. The CEFR seeks to be a comprehensive document that guides the teaching of different languages in various learning situations. Whilst it aims to be as transparent as possible, the content is complex in some parts. The CEFR can act as a guide for decisions made by any teacher of foreign languages (Goullier, 2007). However, to gain a full understanding of the CEFR and its potential for application in testing and in class, several readings may be necessary and some writers have raised questions of whether some parts of the CEFR are clear enough for all users (Piccardo, Berchoud, Cignatta, Mentz, & Pamula, 2011) and some researchers have observed implementation problems. If language teachers do not know and use the CEFR it can not affect classroom practice for teaching and assessment and the benefits for teachers will be reduced.

The CEFR influences curriculum and standards in Turkey in different ways. The common reference levels appear in Turkey's foreign language curriculum. For example, the current foreign language curriculum for 2nd-8th grades aims to adhere to CEFR levels, as shown in Table 1.

Table 1. *Model English Language Curriculum (2018)*

Levels [CEFR] (Hours / Week)	Grades	Skill focus	Main activities / Strategies
1 **[A1]** **(2)**	2	Listening and Speaking	TPR / Arts and crafts/Drama
	3	Listening and Speaking Very Limited Reading and Writing	
	4	Listening and Speaking Very Limited Reading and Writing	
2 **[A1]** **(3)**	5	Listening and Speaking Limited Reading Very Limited Writing	Drama / Role-play
	6	Listening and Speaking Limited Reading Limited Writing	
3 **[A2]** **(4)**	7	**Primary:** Listening and Speaking **Secondary:** Reading and Writing	Theme-based
	8	**Primary:** Listening and Speaking **Secondary:** Reading and Writing	

(MEB, 2018a, p. 10)

This paper reports on a study that aimed to investigate teachers' knowledge, understanding and application of the CEFR and ELP (Tosun, 2019). The study looked at how teachers understood and applied the language used in three tables of the CEFR (Europe, 2001, pp. 24-29) and what the CEFR means to teachers. The study discusses the effects of this understanding on the implementation of the CEFR in Turkey. It does so by taking the example of a group of EFL teachers in a small province in Central Western Anatolia.

In early studies, students were reluctant to use the ELP without teacher support (Glover, Mirici, & Aksu, 2005) or found it difficult to monitor their learning progress (Sert, 2006). These studies indicated the need for a significant role for teaching, teacher support or training in the application of the CEFR. In view of these earlier findings, this study aimed to ascertain whether there were any differences in current views and knowledge of English teachers in Isparta about the experience and use of the CEFR and how teachers saw CEFR levels now.

The study aimed to answer the following questions:

1. What do these English language teachers know about the CEFR?
2. How do these teachers use the CEFR?
3. How does teachers' knowledge affect their teaching?

This study is limited to eight EFL teachers teaching in a local area. The responses of the participants are genuine and sincere, but findings may not be generalizable because of the small number of participants. The opinions of the respondents that are revealed by the current study are limited to the spoken production sections of the CEFR tables and level descriptors only and cannot be considered as representative of all language competencies defined by the CEFR.

The researcher obtained informed consent from the participants and collected background information before the interviews. The related information included gender, age, educational background, department of graduation and teaching experience. There were five female and three male participants, all in their thirties with between six and thirteen years of teaching experience.

The data for the study consist of recorded interviews with each teacher supported by field notes. The data were elicited through a semi-structured interview in two parts. In the first part, participants answered eight questions about the CEFR. They then watched a video recording of a sample Key English Test (KET) speaking test (CambridgeESOL, Accessed 2017) and assessed the level of the two students. They then read the CEFR self-assessment and spoken language use grids (Europe, 2001, pp. 26-29) and reassessed the samples. The recordings of the interviews were transcribed verbatim by the researcher.

2. Findings

In part one of the interview the first interview question was 'Have you received training concerning the CEFR? If you have, what kind of training was that (pre-service training, in-service training, etc.)?' Six of the participants said that they knew little about the CEFR and one reported reading the CEFR herself without receiving any training. Two of the participants reported receiving in-service training about the CEFR. Most of the teachers said that they had neither pre-service nor in-service training. Earlier studies found comparable results regarding English teachers' viewpoints, perceptions and knowledge and their in-service and pre-service training for the CEFR (Sülü & Kır, 2014; Yakışık & Gürocak, 2018).

The second interview question was 'How do you use the CEFR in your teaching?' Relating their teaching to the CEFR, several teachers referred specifically to self-assessment checklists that appear in coursebooks, and CEFR levels required in the MEB curriculum. The teachers know that both curriculum and coursebooks have been designed following the CEFR, for

example, references to 'self-assessment', 'e-portfolio', 'checklists' or 'Can Do Statements'. The participants stated that they believed many activities were inspired or implied by the CEFR, such as role-play, listening to real conversations, dialogue practices, pair and group work and question-answer drills presented in the coursebooks.

The third interview question asked: 'Can you give specific examples of the CEFR influence on the coursebooks you use for teaching in your school?' Most participants' responses indicate awareness that the CEFR has influenced the new coursebooks that were introduced containing self-assessment and portfolio tasks. These practices were seen as applying communicative teaching approaches expected by the CEFR in the foreign languages curriculum. Many activity types presented in the coursebooks provide learners with a topic to talk, write, listen to or read about. Teachers felt that these activities reflected the requirements of communicative language activities within the coursebook design. Teachers said that they were also aware that the curriculum identifies CEFR levels for each grade.

The fourth interview question asked: 'How do you integrate the CEFR into the tests or exams that you use in your school?' The answers varied and involved a range of activities such as self-assessment, portfolios, checklists or performance tasks. For portfolio activities, some teachers said that they check the students' use of the portfolio, but others said that portfolios were not done thoroughly due to the unwillingness of some students to assess themselves, the students' inability to make correct judgements about their progress without help and some learners always describing themselves as good, even when they were not. One teacher said she felt that there were no connections between the CEFR and classroom testing. Other teachers pointed to practical difficulties such as class size and difficulties with including listening, writing and speaking activities in classroom achievement tests when national high-stakes exams only have multiple-choice comprehension questions. The respondents agreed on the availability of self- and peer-assessment tasks in the coursebooks enabling learners to manage, assess and take responsibility for their learning, but could not see the portfolio related to formal tests or exams when they have to give points to students. Some teachers pointed out that their tests were predominantly summative (apart from in the second and third grades) whereas the self-assessment activities implied a formative approach to testing MEB curriculum requirements suggest a combination of different approaches to classroom testing: 'The theoretical frame of testing, assessment and evaluation processes is primarily based on the CEFR, in which various types of assessment and evaluation techniques are emphasized' (MEB, 2018b, p. 6).

The fifth question was: 'Should the CEFR influence the teaching methods, coursebooks and exams?' Although many teachers indicated that they did not know much about the CEFR before the interviews, after discussing the CEFR and coursebooks all of them expressed approval of CEFR influence on language teaching. The reasons that they gave for their approval related to positive influences on teaching and testing procedures that could improve traditional state exams (multiple-choice reading comprehension) and formal teaching methods as well as the practical use of English and attention to the skills of speaking, listening and writing. Most teachers viewed changes to traditional tests positively, although there was caution about student self-assessments influencing summative assessments by the teacher.

The sixth interview question was 'How do your students assess themselves using the CEFR?' Most teachers referred to projects, portfolio work and self-assessment activities. Several teachers voiced caution about the objectivity of the students' self-assessments. Most of the teachers felt that the self-assessment activities could be carried out effectively with teacher support. The responses to the sixth question illustrate that both the curriculum and coursebooks allow students to assess themselves through unit-based self-assessment tools at

the end of each unit, which is a sign of the alignment of the current foreign language programme with the CEFR.

The seventh interview question was 'How do you describe the language used in the CEFR?' and most teachers initially said that they could not answer this question because they did not know the CEFR text. After looking at the CEFR tables in the assessment task, however, the teachers said that the language of the CEFR was accessible to them, but not accessible to the students because of the difficulty of the language. The 'can-do' statements and checklists in the coursebooks, on the other hand, were seen as appropriate for the level of students, although certain unknown words may appear at times and the teacher needed to help, or the students used a dictionary.

The eighth interview question asked: 'Do you think learning English is important?' All the teachers said that they thought learning is important, and provided different personal and practical reasons. Some of the teachers stressed that English is important for personal development because it broadens horizons and expands learning possibilities. Most referred to the role of English as a global *lingua franca* that is needed for travel and business. One pointed out that the students are likely to encounter English anywhere in their daily life, for example, to play games on the computer. One referred to the benefits of learning other foreign languages, not just English. Several noted the value of English for learning other cultures and perspectives, and for explaining one's culture. Some teachers noted that not everyone shared their regard for learning English, as other teachers, parents and students may have other priorities. Some felt that not enough importance was attached to speaking and listening, mainly because of the examination system, and also because class size made paying attention to these skills in class problematic.

The teachers prepared for the second part of the interview by watching a recording of an A2 level Cambridge exam (KET) taken from the internet. The teachers were asked to assess these performances. There was considerable uncertainty amongst most of the teachers about the level of the students in the recording. Two of the eight teachers assessed the performances at B1 level. The others wavered between A1 and A2 level. Two thought that the level was A1 at the start of the exam but A2 at the end. Two teachers thought that the students in the recording were different levels. In the end, half of the performances were correctly assessed at A2 by the teachers.

The teachers then read the CEFR self-assessment grid and spoken language use criteria (Europe, 2001, pp. 26-29) and assessed the performances again. This time the teachers were much more confident about their assessments and all but one of the teachers correctly identified the level as A2, and one teacher thought that one of the two students should be assessed at A1. The number and quality of the language used by the teachers to justify their assessment illustrate how the CEFR table supported the teachers in assessing the students' performances. The teachers used a total of 217 words the first time that they assessed, and 343 words the second time. For the first assessment, most teachers just stated the level that they thought the performance was at or used words such as 'basic level', 'simple' or 'more fluent', or else compared the two students as 'better' or 'lower'. For the second assessment using the tables, the teachers became more confident referring to the topics and complexity of the questions and answers in the exam.

The teachers were then asked: 'How do you find the language used in the tables?' most of the teachers said they found the language clear and comprehensible for teachers to understand, but two felt they were not clear without examples, or needed to be in simpler language for teachers. Two teachers pointed out that the language in the tables was too difficult for beginner

level learners, but one thought that A2 level students would be able to understand the tables with help from a teacher.

The interviews show that the teachers held largely positive opinions about the CEFR and its application, and several showed enthusiasm for teaching a wider range of skills. The teachers also identified several practical difficulties relating to the numbers of children in the class and students' expectations. The teachers raised questions about how skills-based formative assessment practices such as self-assessment can be integrated with classroom achievement tests of grammar and vocabulary which tend to be summative.

3. Conclusions

The study aimed to investigate teachers' knowledge and use of the CEFR and its influences on their classroom practices. The interviews indicated that most teachers know little about the CEFR, but they do use CEFR-related practices such as student self-assessment, portfolios or performance tasks in their teaching because these practices are present in the coursebooks. Most teachers recognised influences of the CEFR on the school curriculum and generally approved of these influences. In recent years different studies have investigated the use of the CEFR in Turkey and the findings of this study are similar to several.

This study found that teachers can see that the CEFR is important and valuable and has connections with classroom practices. They noted and welcomed CEFR influences on the curriculum and coursebooks. These teachers are motivated and they believe that the study of English is valuable for their students. However, most of the teachers in this study received little or no CEFR training and felt that they do not know the CEFR. Other studies have found that state school teachers have little knowledge of the CEFR (Celik, 2013), whereas private school teachers have more knowledge as a result of in-service training (Çağatay & Gürocak, 2016).

Despite this lack of training, teachers can see influences of the CEFR in the activity types in their coursebooks. In recent years there has been an observable attempt to encourage more learner-centred, communicative activities. These attempts derive from the MEB curriculum and coursebooks, and also from the teachers' willingness to apply practices such as self-assessment, portfolios and performance work. It has been observed that CEFR practices are applied in the MEB curricula both for primary (Arıkan, 2015) and secondary education (M. Galip Zorba & Arikan, 2016).

This study found that teachers felt the language used in the CEFR was accessible to teachers. ELT department students were also found to be able to use CEFR common reference level tables such as SAG and SLU to assess speaking (Glover, 2011). However, the teachers in this study felt that they do not know how to integrate the levels into their classroom testing procedures, which compares with other studies that found student teachers felt that coursebooks did not give enough support for successful use of the CEFR (Tüm & Emre, 2017), and teachers have pointed to practical problems occurring in the classroom such as lack of support from coursebooks and class size (Yüce & Mirici, 2019).

The use of the CEFR in Turkey is not an end in itself, but a tool for developing the teaching and learning of foreign languages, and it can be seen that the CEFR has potential to achieve these goals. Teachers in this study and other studies show that they have a positive view of CEFR and its practices that aim to promote communicative competence, for example, state school teachers (Celik, 2013), teachers in training at an ELT department (Güneş & Altıner, 2017; Hismanoglu, 2013; İlin, 2014) and postgraduate students (Mirici & Kavaklı, 2017). Achieving this potential for the development of teaching and learning using CEFR would benefit from more in-service training and guidance as to how the CEFR can be used for assessment.

4. Conflict of Interest

The authors declare that there is no conflict of interest.

5. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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USING REAL ENGAGEMENT IN THE ACTIVE PROBLEM-SOLVING MODEL IN TEACHING SCIENCE: AN INTERPRETIVE PEDAGOGICAL CONTENT KNOWLEDGE STUDY OF AN EXPERIENCED SCIENCE TEACHER
Research Article

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USING REAL ENGAGEMENT IN THE ACTIVE PROBLEM-SOLVING MODEL IN TEACHING SCIENCE: AN INTERPRETIVE PEDAGOGICAL CONTENT KNOWLEDGE STUDY OF AN EXPERIENCED SCIENCE TEACHER

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Abstract

The study aimed to examine and interpret the experiences of an experienced science teacher in Real Engagement in Active Problem Solving Model (REAPS) implementation conducted within the Electricity Unit through a validated pedagogical content knowledge (PCK) framework. To this end, the study examined the efforts of an experienced middle school science teacher, in helping her seventh graders in a rural public school improve conceptual understandings of electricity. She was an information-rich teacher and agreed voluntarily participation in the study. The study was based on a basic qualitative study design. REAPS interview questions and guiding interview questions with prompts were employed as the data collection tools. The data were analysed via in-depth analysis of explicit PCK, enumerative approach, and constant comparisons. The results revealed various characteristics of the usage of REAPS Model, the interactions between the PCK components, and emerged critical incidents in teaching practice. Regarding the usage of REAPS Model, the science teaching experience of the paticipant teacher was expanded with the themes of engagement, real-life experiences, socialization in diverse cultural contexts, teaching in varied physical conditions through argumentation and retention. As an experienced teacher, the interactions between knowledge of learners and knowledge of instructional strategies were central in the teaching performance of the participant reacher. Self-efficacy was specifically found conducive for triggering these interactions together with knowledge of curriculum. However, her science teaching orientation impeded the interactions between most of the PCK components. Finally, critical incidents were found beneficial to the investigations looking for the interactions between three or more PCK components, in particular.

Keywords: Science education, REAPS model, PCK Map, critical incidents, experienced science teachers

1. Introduction

Today, it is known that teachers need more than just having subject matter knowledge (SMK) in understanding, planning, and enacting stages of teaching (Abell, 2008; Alonzo & Kim, 2016). One of the most important factors affecting student learning is the level of the teacher and his/her pedagogical content knowledge (PCK) (Coe, Aloisi, Higgins & Major,

2014; Hill, Rowan & Ball, 2005). Teachers might grasp their students' cognitive and affective capabilities in a particular topic when they use their pedagogical content knowledge base that facilitates student learning (Park & Oliver, 2008b). PCK is a predictive teacher knowledge base that guides teachers' classroom practices (Abell, 2007; Van Driel, Verloop & de Vos, 1998). With this feature, PCK distinguishes teachers from SMK specialists (Shulman, 1986). In addition, it has the characteristics of an amalgam that serves as a bridge between SMK that provides learning content to the student and pedagogical knowledge (PK) (Berry, Depaepe & Van Driel, 2016). Adequate SMK is a pre-requisite that has a major impact on PCK development (Abell, 2007; Rollnick, 2017). In this context, PCK provides the teachers with a pedagogical scaffold to ensure them making abstract and difficult SMK be accessible for student understanding (Mavhunga, 2019). Therefore, the teacher with a robust PCK is more successful in using the specific terminology of the science course and in relating concepts to real-life and other topics (Ingber, 2009). However, to focus only on SMK development in order to understand PCK is not a realistic approach for teacher knowledge base inquiry (Rollnick, Bennett, Rhemtula, Dharsey & Ndlovu, 2008). The context in which the teaching takes place (Grossman, 1990) is also important at this point. Because PCK is discipline-specific, topic-specific, person-specific and context-specific at the same time (Kind, 2009).

Effective teachers should have robust PCK by developing all PCK components (Magnusson, Krajcik & Borko, 1999). However, robust PCK does not guarantee effective teaching in all situations. Because, the effectiveness of teaching is closely related to the interactions of the PCK components of this amalgam to what extent (Abell, 2008; Shulman, 1987). In other words, a teacher's PCK level depends on the interaction among the components and the consistency of these interactions as well as being robust on the basis of each component (Friedrichsen et al. 2009). It was observed that empirical studies related to this were recent and few (Akin & Uzuntiryaki-Kondakci, 2018; Aydin & Boz, 2013; Aydin, Demirdogen, Akin, Uzuntiryaki-Kondakci & Tarkin, 2015; Demirdogen, Hanuscin, Uzuntiryaki-Kondakci & Koseoglu, 2016; Friedrichsen, Driel & Abell, 2011; Park & Chen, 2012). In addition, studies have shown that although the PCK is topic-specific (Abell, 2008; Loughran, Mulhall & Berry, 2004), it is also discipline-specific (Davis & Krajcik, 2005). Teachers' knowledge about discipline-specific strategies (learning cycle) and strategies for specific science topics (images and analogies) (Akin & Uzuntiryaki-Kondakci, 2018). However, self-efficacy of prospective teachers was found to be low in terms of using discipline-specific strategies (e.g. learning cycle) (Uzuntiryaki-Kondakci, Demirdogen, Akin, Tarkin & Aydin-Gunbatar, 2017). Moreover, to the best of our knowledge, studies examining the interactions among PCK components of science teachers using discipline-specific strategies are limited.

As mentioned above, in order to determine the cognitive and affective states of the students effectively with pedagogical maneuvers and to organize teaching accordingly, teachers should create learning environments where students can take their own learning responsibilities and find the opportunity to build knowledge through inquiry. Because students experience their best learning experiences when they actively participate in learning activities (Wu, Paese & Maker, 2015). It is known that students' academic success and conceptual understanding can be improved through active learning (Lumpkin, Achen & Dodd, 2015). In addition to models, which can trigger active learning, and models such as the 5E learning cycle as a discipline-specific strategy that teachers are familiar with from the science teacher education program, relatively new models such as REAPS can also be used. The REAPS Model was developed in 2004 by Maker et al. to develop creative problem-solving skills of gifted students regarding real-life problems (Alhusaini, 2016). Shaping

teaching with model is useful in checking the consistency of goals, and innovative pedagogical models serve meaningful and permanent science learning (Gomez-Arizaga, Bahar, Maker, Zimmerman & Paese, 2016). The general impression obtained from the studies is that the model exhibits a discipline-specific strategy feature in a structure suitable for all science subject content (Gomez-Arizaga et al. 2016; Zimmerman, Maker, Gomez-Arizaga & Paese, 2011). Moreover, it was observed that the REAPS Model can be adapted to the teaching programs of middle school students (Reinoso, 2011).

2. Theoretical Background

The present study was guided by two main frameworks: Hexagonal Model of PCK, and REAPS Model. In this section, these theoretical frameworks were explained to some extent and then related results in the literature were given. Finally, the grounds, purpose, and research questions of this study were included.

The study was both theoretically and analytically grounded in the Hexagonal Model, which identifies PCK as an integration of the six PCK components. The Hexagonal Model is the added heuristic version of the self-efficacy component of the Pentagon Model, which was proposed by Park & Oliver (2008b). The basic assumption the model embraced is that PCK includes reported and enacted stages regarding student learning. Teacher self-efficacy is a mediator factor and serves as a conduit to bring together the stages of PCK in practice. The more teachers report high self-efficacy before teaching, the more they enact effectively their teaching plans. This cycle becomes more strengthened and cohent in turn following successful teaching performances. All the components in the model are in ongoing interactions within a given context (e.g. electricity). These integrations rely heavily on the reflections including reflection-on-action and reflection-in-action. It means that as a teacher develops PCK through reflection, the interactions between and consistency among the PCK components may improve. However, improvement within a single component is not necessarily guarantee high level reported and enacted interactions among the components in practice.

Unlike the Pentagon Model, in the Hexagonal Model, the knowledge of learners (KoL) component is positioned as a relative starting point. It can be said that understanding and implementation of the reflective process is directed towards the KoL-originated sub-components (e.g. needs, interest/motivation, and learning difficulties). In this case, it can be said that the learning outcomes of the REAPS teaching model discussed in this section are similar to the Hexagonal Model. Problem-based learning is based on experience-based learning related to solving and investigating complex and real-life problems (Torp & Sage, 2002). The purpose of the REAPS model, which is based on problem-based learning, is to complete the traditional science teaching program for ensuring meaningful learning and permanent learning, with the participation of different problem-solving strategies (Gomez-Arizaga et al. 2016). As well as being a model that aims to improve students' creative problem-solving skills, REAPS Model is also an integrated model, which is based on the concept of engagement and offers a three-component structure on the basis of student interests, needs, and learning difficulties (Maker & Zimmerman, 2008). In other words, the REAPS Model is an inclusive teaching model supported by DISCOVER (Discovering Intellectual Strengths and Capabilities while Observing Varied Ethnic Responses) and TASC (Thinking Actively in a Social Context) components (Maker, Zimmerman, Alhusaini & Paese, 2015). During the use of closed-ended and open-ended problem scenarios, the DISCOVER component acts as an agent and allows it to be adjusted according to the place of scientific inquiry in the learning process. The development of multiple skills is key for this component (Webber, Riley, Sylva & Scobie-Jennings, 2018). Therefore, teachers who will

teach with DISCOVER were given a guideline in this multi-skill development process. In this directive, teachers are expected a) to provide their students with the opportunity to solve different types of open-ended problems during their teaching, b) to actively use hands-on activities for each skill development, and c) to reflect the elements based on the student's own cultural background and the sensitivities of the civil society that shaped it on the curriculum in practice (Maker & Zimmerman, 2008). In making open-ended problem scenarios functional, the TASC component performs duty rather. The TASC component is based on the use of thinking skills and thus ensuring that students find answers to their own questions (Ball & Henderson, 2008). Like the Hexagonal Model, the REAPS Model refers to students' learning through reflections. These similarities encouraged us to combine these models in a teaching context using REAPS Model as a discipline-specific strategy in the theoretical framework of Hexagon PCK Model.

Since PCK has a tacit structure, it can be said that setting out operational definitions of its components will serve to make the comments made on the assumptions of the two models more valid (Henze & Van Driel, 2015). The six components included in the Hexagon PCK Model were covered under the following definitions:

- STO typically refers to teacher's knowledge and beliefs about the goals and purposes of science teaching at a specific grade level.

- KoC contains knowledge about compulsory goals and objectives mandated by national science teaching programs, as well as the characteristics of vertical and horizontal curriculum.

- KoL consists of knowledge about the learners' prior knowledge and learning difficulties they often encounter during science learning.

- KoA includes two distinct but interacted sub-dimensions that define teacher knowledge about what to assess (e.g. science process skills) and how to assess (through portfolios or written tests).

- KoIS comprises of two sub-dimensions: knowledge of discipline-specific strategies (e.g. learning cycle) and knowledge of topic-specific strategies (representations and analogies). Knowledge of topic-specific strategies consists of teachers' knowledge about useful strategies for teaching particular topics in science teaching program, with topic-specific representations and activities. The activities including demonstrations, experiments or simulations serve as facilitators to provide students the chance to construct the knowledge in the learning environments (Akin & Uzuntiryaki-Kondakci, 2018; Magnusson et al. 1999).

- Teacher self-efficacy is a wide-ranging belief that has its origins in socio-cognitive theory and is closely related to positive teaching actions and qualified student learning. When teachers believe that their capacity is sufficient to successfully execute the PCK, they tend to pursue teaching practices in that direction. Moreover, self-efficacy was found to be linked with the integration among PCK components (Henson, 2001; Pajares, 1992; Park & Oliver, 2008b).

Based on the Hexagon PCK model, reflection is an agent that triggers interaction among components (see, Park & Oliver, 2008b). Therefore, reflection has a highly invaluable role in professional development (Schön, 1987). Reflective practice is linked with the use of critical incidents (Tripp, 2011). Because critical incidents are reflective thinking tools (Bruster & Peterson, 2013). Critical incident refers to turning points or changes of perception of success (Thuynsma, 2001). Thanks to critical incidents, teachers might question their practice more

deeply and get new insights into the challenging nature of teaching (Nilsson & Loughran, 2012). Examination of critical incidents that teachers give meaning in their teaching processes and that have positive or negative pedagogical traces can give access to more in-depth information about the reflection-laden theoretical structure of the Hexagon model. Departing from this assumption, it was thought that it would be beneficial to make interpretations in the name of understanding and enactment of PCK, which strengthens the interaction among PCK components through reflections carried out on critical incidents that have recently been used frequently in the educational field. Critical incidents, which provide information about the real experiences of the participants, to which they attach importance, can be revealed through personal narrative vignettes (Angelides, 2001; Howitt & Venville, 2008). The reflective process in the hexagon model was triggered by uncovering and discussing the critical incidents during the interviews.

To date, it was observed that there are few empirical studies examining the interaction among PCK components explicitly and that the general trend in studying these interactions is the use of PCK Maps (e.g. Akin & Uzuntiryaki-Kondakci, 2018; Aydin & Boz, 2013; Aydin et al. 2015; Demirdogen et al. 2016; Park & Chen, 2012). For example, in their study investigating the teaching practices of biology teachers, Park & Chen (2012) examined the interaction among five PCK components. Due to the topic-specific structure of the PCK, its implementations were discussed under photosynthesis and heredity topics. In-depth analysis of explicit PCK, various results were reached through the enumerative approach and constant comparisons. Accordingly, it was found that the KoL-KoIS interaction was at the center of the interaction among all components, that the KoC and KoA components were the components that interact the least with the other components, and that the KoA component interacts more frequently with KoL and KoIS components. Findings regarding the KoL-KoIS interaction were also found in the more recent study of the first author (Suh & Park, 2017). It was also concluded that the didactics orientation makes the interaction of the KoIS component with other components impede. In a similar vein, Aydin & Boz (2013) discussed the interaction among PCK components of two experienced chemistry teachers under the electrochemical cells and redox reactions topics. The methodological process was conducted in accordance with the previous study. Similarly, as a result of this study, it was observed that the KoL-KoIS interaction was at the center of the interaction among all components and the KoC and KoA components were the components that interact the least with other components. In another study, Aydin et al (2015) examined prospective teachers' PCK development through the core-based mentoring practicum course, again on the basis of interactions among components. As a result of the study, it was seen that the most development was in the interactions among KoC and other components and no interaction of KoA with KoIS was found. The fact that the KoA level of experienced chemistry teachers is at the level of pedagogical knowledge may explain this situation (Aydin et al. 2014). In the conclusion, the practicum course was found to be effective, because, it was determined that the prospective chemistry teachers' PCK Maps, which were fragmented before the course, became integrated after the course. Through pedagogical instruction framed by PCK for NOS, Demirdogen et al. (2016) reached various results in the name of PCK for NOS through in-depth analysis of explicit PCK and constant comparisons. Unlike previous studies, PCK Maps of prospective chemistry teachers were drawn according to interactions obtained through lesson plans and reflection paper rather than observing teaching performance. The researchers created a coding scheme that examines whether these interactions show consistency or connection. As a result of the study, it was understood that the pedagogical instruction framed by PCK for NOS was effective on the interaction among components. Besides, it was concluded that pre-requisite knowledge is required for effective NOS teaching, that PCK for NOS level improved from knowledge level to application level, and

that highly-level interactions among PCK components lead to effective NOS teaching. Finally, Akin & Uzuntiryaki-Kondakci (2018) examined the interaction among PCK components by comparing the teaching performance of novice and experienced chemistry teachers. In the methodological sense, the same three approaches gave direction to this study. Eight general patterns were reached after constant comparisons. Accordingly, novice teachers' broad and non-specific science teaching orientation impedes the topic-specific interaction among PCK components. Experienced teachers were able to interact more than two PCK components in most cases and therefore, their PCK Maps were more integrated. As in previous studies, the KoL-KoIS interaction was central, finally, teacher self-efficacy was effective in increasing or decreasing interactions among PCK components.

The model of Magnusson et al. (1999) continues to be the first PCK framework in the context of science education. However, its explanatory power on how to ensure the interaction among PCK components is limited. Therefore, in this study, the Hexagon PCK Model, which deals with the interaction among PCK components as a sixth component, together with teacher self-efficacy, and evaluates this interaction process in the context of activating reflective thinking, was adopted as the theoretical framework (Park & Oliver, 2008b). To the best of our knowledge, this study is the first study based on this model in questioning the experiences regarding PCK enactment. In a recent study, Hanuscin, Cisterna & Lipsitz (2018) found that teachers with more teaching experience in a class developed better PCK than teachers with more experience. The science teacher, who is the participant of this study and is a REAPS practitioner, has more than three years of science teaching experience with her students in her classroom. Therefore, it has information-rich feature in this and many similar aspects. Reviewing the relevant literature, it was seen that the studies on the REAPS Model, one of the relatively new discipline-specific teaching strategies generally focused on determining the views on the implementation of the model (Gomez-Arizaga et al. 2015; Wu et al. 2015), determining the effect on creative problem solving skills (Reinoso, 2011), its effect on class participation and academic success (Riley et al. 2017; Webber et al. 2018). Therefore, in terms of the original and possible results in regard of examining the teaching experiences of a science teacher implementing the REAPS model under the framework of PCK, it can be said that this study is a research report that can potentially guide future studies. To address above gaps in the literature, the purpose of the study was to examine and interpret the experiences of an experienced science teacher in REAPS Model teaching practice conducted within the Electricity Unit. The following tree research questions guided the investigation:

1. What are the perceptions of the participant about her own REAPS implementation?

2. What is the participant's perception of the interaction among her REAPS implementation and the PCK components that arise meanwhile?

3. What do critical incidents indicate about the interaction between the various components of PCK?

3. Method

The present investigation was interpretive and emergent in nature (Bogdan & Biklen, 2003; Tobin, 2000). In particular, the investigation focused on the meanings that an experienced science teacher ascribed to her REAPS implementation carried out in a rural middle school with seventh grade students.

3.1. Research Design

Basic qualitative research design was used in the study (Merriam, 2002, 2009). The fundamental assumption that qualitative research is based on is that reality is formed by the interaction of individuals with the social environment they live in (Merriam, 1998, 2015). As a matter of purposive sampling, this study was carried out with a single participant who was thought to be information-rich. For confidentiality, she was given pseudonym as "Beyza". When Beyza started practicing, she has 3-year experience of science education. In order to better demonstrate the tacit interactions among PCK components, she has performed the REAPS Model, which she uses as a discipline-specific instructional strategy, by using the electricity unit in a topic-specific direction.

3.2. Data Collection

In this study, data were collected using a semi-structured interview form. The interviews were conducted in two sessions under the supervision of the first researcher. The first session mainly consisted of questions involving the implementation of the REAPS Model, while the second session was carried out through questions aimed at revealing the interactions among PCK components.

3.3. Data Analysis

The data obtained from the interviews were analyzed through four different methodological analyzes and thus, triangulation was performed. At this point, the purpose is to examine Beyza's perceptions about the implementation realized through the REAPS Model using different methodological analyzes and thus, to minimize the validity problems that may arise from using a single data collection tool.

Semi-structured interviews were analyzed separately. In the first interview covering the questions about the implementation of REAPS, in order to determine the participant's teaching experiences, the interview questions prepared by Wu et al. (2015) were used as a guideline. The content analysis method was used to identify the concepts and relationships that explain the data obtained. In content analysis, similar data are brought together and interpreted within the framework of certain concepts and themes (Yıldırım & Simsek, 2013). In the second interview, PCK interview questions were used which mainly covered the questions to identify the PCK components that were prepared by Carpendale (2018) and the interactions among PCK components. The data obtained as a result of these interviews were interpreted in line with the Hexagonal Model of PCK introduced by Park & Oliver (2008b).

The data obtained by performing an in-depth analysis of explicit PCK over the data obtained from both interviews were used for drawing the PCK Maps of Beyza. The PCK mapping method is a useful tool in making the tacit PCK explicit (Park & Chen, 2012). Since it was aimed to determine Beyza's general perception of teaching instead of monitoring the teaching performance itself; rather than teaching in one course, the entire REAPS implementation was accepted as a single session. This analysis was used to determine the interactions among PCK components that emerge in a particular teaching segment in a particular session. The mutual interaction among the two components has formed the operational definition of the segment. Rather than interactions among each segment, the entire implementation process is covered under a single PCK Episode consisting of possible segments.

The data obtained after the in-depth analysis of explicit PCK were visualized as a PCK Map using the enumerative approach. Numerative approach is an approach in which the mutual interactions among PCK components are considered equal in strength (LeCompte & Preissle, 1993). It is assumed that the more numbers indicated on the arrows, the more

interacting the components are. Excessive strong interactions among components indicate robust PCK. Since the conceptual framework of the analysis used to find answers to the second and third research questions of the PCK Map is a Hexagonal Model of PCK, it consists of arrows showing the five components and the possible relationships among these components, except for self-efficacy. In the interest of providing analytical convenience, it is assumed that all of these arrows have the same strength (Park & Chen, 2012). In categorizing these interaction numbers, the framework suggested by Aydin et al (2015) was used. Accordingly, the bold lines among components point to the upper level, solid lines medium level, and dashed lines lower level PCK interaction categories.

Since the PCK Map that was created to show the interaction among the REAPS model and PCK focuses on binary interactions among components, the coding scheme developed by Demirdogen et al. (2016) was used as it has a similar analysis logic (see Table 1). In accordance with this coding scheme, in the present study, the analysis was made according to whether binary interactions show consistency or connection. Since STO influenced other components, attention was paid to the presence of consistency in STO interactions and the presence of connection in other components as they inform each other.

Table 1. *Coding scheme for the interactions among PCK components*

PCK Components	Explanation	Consistency/ Connection	Direction
STO-KoC	Considering a particular curriculum emphasis in class (i.e., nature of science objectives) because of his/her goals and purposes for science teaching	Consistent	STO influenced KoC
STO-KoL	Considering students' difficulties, misconceptions or pre-requisite knowledge based on the teacher's goals and purposes for science teaching	Consistent	STO influenced KoL
STO-KoIS	Using a particular instructional strategy to reach goals and purposes for science teaching	Consistent	STO influenced KoIS
STO-KoA	Assessing a particular knowledge or skill for determining whether students reached his/her goals and purposes for science teaching	Consistent	STO influenced KoA
KoC-KoL	Considering a difficulty, misconception, or pre-requisite knowledge by reviewing the curriculum in terms of what students should have learned and will learn about those topics	Connection	KoC informed KoL
KoC-KoIS	Using a particular instructional strategy to address a particular curriculum objective	Connection	KoC informed KoIS
KoC-KoA	Using various assessment strategies to identify students' achievement in the curriculum objectives related to the topic, or to reveal what students know about the topic from the same and different grades	Connection	KoC informed KoA
KoL-KoIS	Using a particular instructional strategy to remedy a difficulty, misconception, pre-requisite or knowledge	Connection	KoL informed KoIS
KoL-KoA	Using various assessment strategies to identify students' difficulties, misconceptions or pre-requisite knowledge	Connection	KoL informed KoA

KoIS-KoA	Revising the instruction based on the feedback taken from assessments	Connection	KoIS informed KoA

Finally, the incident form suggested by Nilsson & Karlsson (2019) was used in the examination of critical incident in the center of REAPS model and PCK interaction. In this form, titles of incident where she thinks she succeeded/failed, why she thinks she succeeded/failed and consequences for further teaching and their corresponding PCK components take place. While searching for critical incidents within the scope of all interview data, the researchers based the criteria of the participant's self-expression of the success or failure situation and the presence of evidence on the fact that at least three PCK components affect each other positively or negatively in the mentioned cases (Kilgour, Northcote & Herman, 2015). By this process, a list of potential critical incidents was identified. Finally, six incidents were then discussed during semi-structured interviews in detail using probe questions to bring out the meaning of these incidents to Beyza, and to determine their significance from her perspective (Hanuscin, 2013).

3.4. Credibility Issues of the Study

The present study included only semi-structured interview data. To increase and ensure credibility issues of the study, we triangulated the study theoretically. Theory triangulation uses different theories or theoretical frameworks (REAPS Model, Hegzagon PCK Model, PCK Components Coding Scheme) to analyze and interpret data. With this type of triangulation, various theories or hypotheses in contact can make the researcher available for providing supporting or refuting findings (Patton, 1999).

A three-step coding procedure was employed. The first and second steps were about the analysis of the data collected through open-ended questions and related semi-structured interviews. The remainder was about the emerging patterns brought about through comparing and contrasting the data including REAPS implementation, interactions between PCK components and critical incidents. To begin, the first researcher having studies on REAPS implementation and an expert on PCK analyzed the entire data set independently, but all the steps were proceeded in turn. Discrepancies between coders were resolved through weekly negotiations. Interrater reliability on the course of deductive coding ranged from 78 to 86 % (Miles & Huberman, 1994).

3.5. Ethical Considerations

In Turkey, a permission for conducting research studies is required and given by Institutional Review Board. We obtained this permission from Adiyaman University Institutional Review Board. In addition, Beyza voluntarily participated in the study after being informed that she is among the first REAPS implementers in Turkey. She flushed with pleasure to participate in the interviews to share her specific teaching experiences regarding the implementation and receive constructive feedbacks with her science teaching in the near future. She consented to make the findings available for researchers to validate (Creswell & Miller, 2000).

4. Results

4.1. Results Related to the Participant's REAPS Implementation Experiences

In the content analysis made through data obtained from semi-structured interviews, various themes have been reached under the category of Beyza's (the participant) REAPS implementation. It was seen that these themes consisted of retention, engagement, physical conditions, real-life experiences and socialization, cultural context, emotions, intrapersonal

skills, collaboration, and argumentation. Table 2 shows the excerpts of participant's responses.

Table 2. *Emerging themes regarding the participant teacher's REAPS implementation*

Category	Themes	Related excerpts
Beyza's REAPS implementation	Retention	As it includes skills such as generating ideas and making decisions by students, TASC remembered easily. The fact that students develop their ideas gradually throughout the TASC component deepens their conceptual understanding and makes these ideas more retained.
	Engagement	Prior to implementation, I had thought cognitive engagement was sufficient. As time progressed, I realized that this model requires affective and behavioral engagement and I observed that.
		I saw that even students who remained passive in the classroom took action and participated more actively in some thinking skills, especially in group discussions and discussion activities.
		The TASC component is the vital component because in this component the student becomes more active.
	Physical conditions	I tried to bring everything to the classroom in the whole process. However, I think that lack of physical conditions negatively affects the learning process. Because there is no laboratory since it is a village school.
	Real-life experiences and socialization	My initial perception against REAPS began to develop over time with the idea that it improved life skills and enabled them to socialize. I noticed that the model improved life skills over time.
	Cultural context	Particularly the DISCOVER component of REAPS enables students to face the problems they encounter in their own sociocultural environment. This situation contributed to the acceleration of the development of life skills of students.
	Emotions	The experiments attracted a lot of attention. I observed that the female students remained a little more passive during the experiments. This may be due to the fact that the topic of the lesson was electricity.
		Working in touch and being able to comment on their own were making the students happy. This situation was appealing to me, too.
		Before the implementation, I performed semi-structured interviews with the students in order to get suggestions for the course. I noticed that the students were always actively depicting me during the interviews. This was a disappointing moment for me because I supposed that I stayed away from traditional approaches throughout my teaching life.
		It was not in my plans to develop students' argumentation skills. However, seeing my students improve these skills over time made me very happy.
	Intrapersonal skills	When my students study in groups in constant touch, all of them were satisfied as one of them assists and supports her friend in the moments she falls behind.
	Collaboration	In order for my other student to assist the lack of his/her friend, I tried to create heterogeneous groups before the application steps. The students wrote something and delivered it in writing. However, to understand whether they were studying collaboratively, I reviewed the concept maps they generated.
	Argumentation	Unlike the traditional approach, my students have begun to justify their claims and to present counter-claims, especially in the last few weeks, while using the REAPS Model. The whole class was very enthusiastic and motivated about this.
		While defending their claims in the discussion activity, they did not defend them in a hardheaded manner. They based their claims on certain bases. By listening to the other's opinions, they were asserting arguments in a way to refute the justifications of them. The development of skills that I had not planned at first and that emerged throughout the process made me happy.

When asked about her first impression of REAPS, it was seen that Beyza (the participant teacher) classified the model with active learning models. Defining active learning potentially as "*the type of learning in which the teacher is a guide who designs or uses activities that will enable students to be more active, and the students are participants who build knowledge in this process*", Beyza placed the concept of "engagement" at the center of this type of learning. Emphasizing the importance of cognitive, affective and behavioral engagement, Beyza stated that towards the last weeks of her practice, students systematized affective and behavioral participation as well as cognitive participation. Beyza expressed her opinion that what distinguishes the model from other models is that it has sub-components. She stated that the active learning models which she used previously led the students to participate more cognitively and she thought she fell behind due to being inexperienced in conducting model-based lessons. As the interview progressed, Beyza stated that her perception of the model was not limited to active learning and that she gradually saw that this model was more effective for students to gain real-life experiences, to socialize and to communicate with each other in this way. Beyza touched on this subject as follows:

"*As the weeks progressed, I realized that the model was trying to teach life skills. Because these life skills are also included in the skills section of the science teaching program. We have to upskill students with these skills. I have seen that the purpose of the model is also compatible with the aims of the program.*"

In addition to the perception that the model is compatible with the program, Beyza emphasized the importance of problem scenarios in gaining life skills as follows:

"*Since the issues I am linking with are life itself, I thought that I should prepare particularly the problem scenarios in line with the program's learning outcomes. Furthermore, because the scenarios are inherent in REAPS, I can say that I did not find it difficult to associate the problem scenarios with daily life.*"

Beyza stated that when creating problem scenarios, she particularly touched on the items related to the students' own culture because she believes that teaching the DISCOVER component of REAPS should be associated with the cultural and social environment of the students. Beyza especially emphasized the fact that she understood that the model aims to provide life skills thanks to this component of the model. She pointed out that through discussions and debates in accord with REAPS, even the students who remain passive and do not show any attendance to the lesson became more active.

Beyza stated that REAPS is related to decision-making skills, one of the life skills in the curriculum, as follows:

"*I saw that, in the TASC component, it was focused on students' skills such as generating an idea, implementation, and decision making. The science teaching program also includes the goal of developing this skill.*"

Stating that TASC is the propellent component of the model, Beyza mentioned that this component is the one that activates the other two components. Because, according to her, students were most active during the activities related to this component in the classroom.

Regarding content teaching, Beyza thinks that she used alternative teaching approaches compared to the past during the implementation of this model. She stated that she felt more comfortable in the DISCOVER and PBL components in terms of teaching the content within the electricity unit and she understood that it is more appropriate to transfer the content with these two components. Beyza has expanded her experience with content teaching as follows:

"Compared to my previous lessons, which I supposed that I have my students make active-learning, I think the model has a serious contribution to me in content teaching. I noticed this very clearly in the classroom."

In general, Beyza stated that the physical conditions of the school and the classroom limit the implementation of REAPS. According to her, the absence of a lab prevented some experiments from being performed. Beyza expressed that instead of these experiments structured on the TASC component, she continued the lesson with discussion-based group work, and that she had to perform demonstration experiments using simple materials.

Beyza mentioned that most of the experiments she had done with simple materials aimed at the development of multiple skills in the DISCOVER component of the REAPS model. Moreover, she stated that she included these multiple skills in problem scenarios as a precaution due to the lack of materials.

Beyza pointed out that student interest emerged mostly during the experiments, but that the female students remained passive during the experiments compared to the male students. Stating that being in contact motivates the students, Beyza added the following views:

"Some of my students contributed a lot, some did not. This may be due to the fact that the topic of the lesson was electricity. Because the female students were very active in group discussions while remaining passive in experiments. However, I think this is mainly due to the fact that I did not give them enough opportunity to reflect within the group. Because, in some cases when they work as a group, I noticed that they shared things that each other did not know, as they shared their ideas."

"Things written about problem scenarios during group activities were often similar. Answers were often given under the supervision of the dominant student within the group. I did not like this situation. I decided to have a concept map drawn in order to reach the answers of all students. To reach the answers of all students, I decided to ask my students to draw concept maps. Thus, I have seen better the difference and variation between the answers."

Finally, Beyza explained how the model affected scientific discourse in the classroom as follows:

"Especially in the last two weeks of the five-week implementation process, I saw that female students are now starting to defend their claims not only in journals but also during discussions. Meanwhile, I asked them to carefully listen to their peers' opinions and I insistently stated that they could also change their own claims according to these views. I saw that they stopped being hardheaded at their discussion activities. The justification of the allegations had become a habit. Some students were quite good at producing opposite and confuting arguments.

4.2. Results Regarding the Perception of Interaction Among the Participant's Own REAPS Implementation and the PCK Components that Emerged

This study, in order to reveal the interactions among PCK components more clearly, first revealed Beyza's science teaching profile, and then interactions were visualized through PCK Maps. The strength of each interaction in the map was assumed to be the same. Hence, increasing the number of interactions among binary components indicates that the interaction is strong to that extent (Park & Chen, 2012). Table 3 shows the profile information of Beyza.

When Table 3 is examined, it is seen that the central orientation of Beyza, who teaches in the context of the electricity unit, was everyday coping, while her peripheral orientation, on the other hand, was didactics (Friedrichsen & Dana, 2005). It was observed that Beyza, who

uses the REAPS Model as a discipline-specific instructional strategy during her teaching, has peripheral learning outcomes including multiple skills, social and communication, and critical thinking skills, as well as SMK learning outcomes.

Table 3. *Beyza's PCK profile*

Subject Matter:	Electricity
Science teaching orientations:	Central: Everyday coping; Peripheral: Didactics
Discipline-specific instructional strategy:	REAPS Model
Peripheral learning outcomes:	Multiple skills, social and communication skills, critical thinking skills
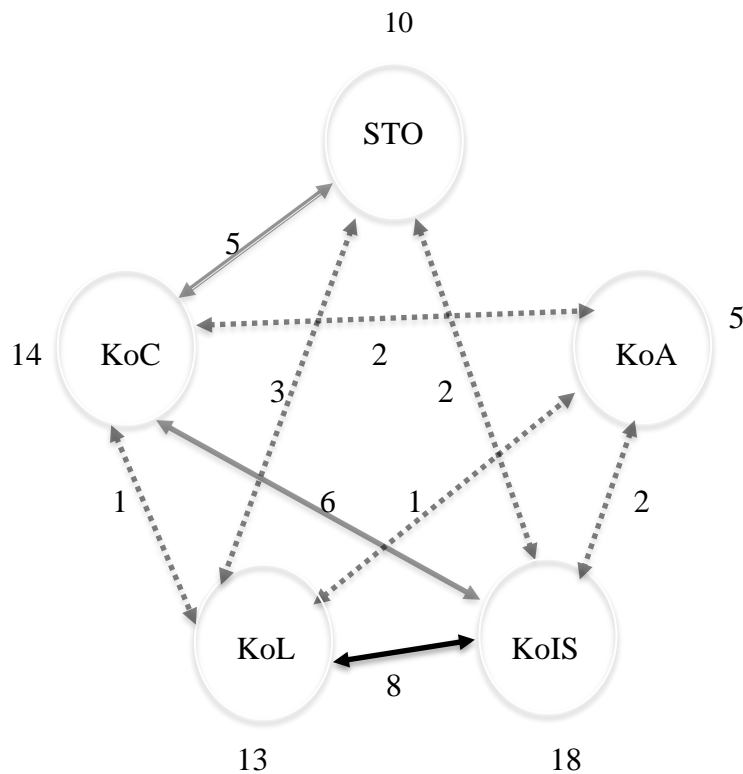
1-3: dashed lines
4-7: solid lines
8+: bold lines
(Aydin et al. 2015).

As shown in Table 3, Beyza integrated the components of KoIS, KoC, KoL, and KoA 18, 14, 13, and 5 times, respectively. Examining the PCK Map of Beyza, it was seen that the number of interactions between components was predominantly in the category of low-level interactions (1-3 interval). It was observed that the interactions in this category were minimum between the components of KoL with KoC and KoA. It was remarkable that particularly the interactions among KoA and other components accumulated in this category. It was seen that the interaction of KoC with STO and KoIS was central in the upper category. It was determined that only KoL and KoIS interactions took place in the upper category (8+). Unlike the many interactions particularly in the medium and upper level categories, it was found that there was no interaction among STO and KoA components. KoC allows to reveal

the difference in importance between key concepts and peripheral concepts. KoC-KoIS interaction of Beyza emerged in the lower category. However, it was remarkable that, during the interviews, Beyza stated that she thought that her KoC was weak since she could not fully teach the learning outcomes in the program. Table 4 shows the coding scheme analysis of the data obtained from the first interview.

Table 4. *Results* obtained *from the interview through REAPS questions*

PCK Components	Explanation	Consistency/ Connection	Direction
STO-KoC	STO: Everyday coping; KoC: Life skills	Consistent	STO influenced KoC
STO-KoIS	STO: Everyday coping; KoIS: REAPS model	Consistent	STO influenced KoIS
KoC-KoIS	KoC: Learning outcomes in electricity unit; KoIS: Experiments and problem scenarios	Disconnection	KoC informed KoIS
KoC-KoIS	KoC: Life skills; KoIS: Problem scenarios	Connection	KoC informed KoIS
KoC-KoIS	KoC: Learning outcomes in electricity unit; KoIS: Activities, REAPS Model	Connection	KoC informed KoIS
KoL-KoIS	KoL: Pre-requisite knowledge, learning speed; KoIS: Question-answer	Disconnection	KoL informed KoIS
KoL-KoIS	KoL: Pre-requisite knowledge ; KoIS: Concept maps	Connection	KoL informed KoIS
KoL-KoIS	KoL: Lack of interest in electricity; KoIS: Out-of-school trip	Connection	KoL informed KoIS
KoL-KoIS	KoL: Needs; KoIS: Reflective journals	Connection	KoL informed KoIS
KoL-KoA	KoL: Pre-requisite knowledge, conceptual understandings; KoA: Working papers, POE strategy, concept map, reflective journals	Connection	KoL informed KoA

Various inferences have been reached through the interactions specified in Table 4:

- KoC-KoIS interaction that takes place in the medium category on the PCK Map provides REAPS-specific activities for learning outcomes in electricity unit, while it provides connection with each other when using problem scenarios. However, disconnection occurs between components when using experiments.
- Everyday coping orientation consistently influenced the teaching life skills included in the program and using of REAPS Model as a discipline-specific instructional strategy.
- Concept maps, reflective journals, and out-of-school trips show a connection in revealing the pre-requisite knowledge, needs, and interest on the topic, respectively. It was seen that, on the other hand, the question-answer strategy shows disconnection in revealing the pre-requisite knowledge.

- Two contradictions draw the attention in this analysis. It was seen that STO-KoIS interaction that showed only two interactions in the PCK Map was consistent, contrary to expectations, while KoL-KoIS interaction that showed eight interactions showed disconnection. According to Beyza's perception, the reasons that created this situation were the fact that Beyza thought she could not use the experiments effectively and the fact that she had to use the question-answer method too much, respectively. Another contradictory example was the fact that there was consistency between KoL and KoA, showing only one interaction. These contradictory examples provide evidence that the strong relationships identified in the PCK Map do not always guarantee consistent relationships.

Table 5 shows the coding scheme analysis of data obtained from second interview. Various inferences have been reached through the interactions specified in Table 5:

- It was seen that STO-KoL interaction that presents interaction at a low level in the PCK Map showed consistency by determining the pre-requisite knowledge and needs of the everyday coping orientation in learning outcomes in electricity unit, however, it showed the same consistent effect in determining students' interests and motivations of didactics orientation. Due to the fact that it took place at a low level in the PCK Map, the first two findings can be regarded as unexpected situations and the last finding as an expected situation.
- In STO-KoC interaction that shows medium interaction in the PCK Map, the everyday coping orientation has consistently influenced the teaching of key concepts and the learning outcomes in electricity unit, while didactics orientation inconsistently influenced KoC.
- KoC-KoIS interaction that shows medium interaction in PCK Map was provided through activities based on the learning outcomes in electricity unit, while through experiments on electrical circuit elements in introducing the materials recommended in the curriculum, and through connections between experiments for multiple skills under the DISCOVER component of the REAPS Model.
- KoL-KoIS interaction that shows upper interaction in the PCK Map leads to the use of REAPS activities thanks to the availability of classroom size, besides, the use of the question-answer strategy reveals pre-requisite knowledge. POE activity provides connections to overcome misconceptions; concept maps and reflective journals to overcome learning difficulties.
- In this analysis, seven contradictions draw attention.

Table 5. *Results obtained from the interview through PCK questions*

PCK Components	Explanation	Consistency/ Connection	Direction
STO-KoL	STO: Didactics; KoL: Interest, motivation	Consistent	STO influenced KoL
STO-KoL	STO: Everyday coping; KoL: Needs	Consistent	STO influenced KoL
STO-KoL	STO: Everyday coping; KoL: Pre-requisite knowledge	Consistent	STO influenced KoL
STO-KoC	STO: Didactics; KoC: Learning outcomes	Inconsistent	STO influenced KoC
STO-KoC	STO: Everyday coping; KoC: Learning outcomes	Consistent	STO influenced KoC
STO-KoC	STO: Didactics; KoC: Handling the learning outcomes under inquiry	Inconsistent	STO influenced KoC
STO-KoC	STO: Everyday coping; KoC: Core concepts in science teaching program	Consistent	STO influenced KoC
STO-KoIS	STO: Everyday coping; KoIS: Activities, teaching techniques	Consistent	STO influenced KoIS
KoC-KoIS	KoC: Multiple skills under the DISCOVER component; KoIS: Experiments	Connection	KoC informed KoIS
KoC-KoIS	KoC: Materials suggested in the program; KoIS: Experiments related with circuit elements	Connection	KoC informed KoIS
KoC-KoIS	KoC: Learning outcomes; KoIS: Activities	Connection	KoC informed KoIS
KoL-KoIS	KoL: Classroom size; KoIS: REAPS usage	Connection	KoL informed KoIS
KoL-KoIS	KoL: Pre-requisite knowledge; KoIS: Question-answer	Connection	KoL informed KoIS
KoL-KoIS	KoL: Misconceptions; KoIS: POE activity	Connection	KoL informed KoIS
KoL-KoIS	KoL: Learning difficulties; KoIS: Concept map, reflective journals	Connection	KoL informed KoIS
KoL-KoC	KoL: Readiness; KoC: Curricular saliency	Connection	KoL informed KoC
KoC-KoA	KoC: Learning outcomes; KoA: Concept map, reflective journals	Connection	KoC informed KoA
KoIS-KoA	KoIS: Problem scenarios; KoA: Evaluation form	Connection	KoIS informed KoA
KoIS-KoA	KoIS: Problem scenarios; KoA: Rubric	Connection	KoIS informed KoA

4.3. Results Regarding Critical Incidents Emergent During REAPS Implementation

It was observed that experienced teachers were able to interact more than two components (Akin & Uzuntiryaki-Kondakci, 2018). In this study, the critical incident operational definition was structured through this information. Departing from this point, in order for a situation to be a critical incident, it was sought that it occurred in the interaction of at least three PCK components. In this part, six critical incidents determined based on Beyza's experience in REAPS implementation were exemplified in detail with tables and extended excerpts (EE) accompanying each table. Three of these critical incidents were successful incidents (S1, S2, S3), while the other three were failed (F1, F2, F3) incidents.

4.3.1. Successful critical incidents

Course of events (S1)	Interacted PCK components
Incident where she thinks she succeed Designing a classroom environment suitable for group discussions	KoC: Communatication skills KoL: Student interest KoIS: REAPS activities
Why she thinks she succeed She says that the activities she developed according to the REAPS Model increased intra-group interaction, the engagement level of female students, and the frequency of communication with other students.	
Consequences for further teaching She says she will try to increase students' oral communication in her next lectures.	

EE-S1: Students' interest was generally at high levels during the experiments. However, female students' interest was significantly lower than male students and during the experiments, the female students took supporting roles more. During the group discussions, on the other hand, the female students were more eager and active. My incapability to create a learning environment that would provide them with equal opportunity to communicate may have been effective in this case. As the implementation continued, their communication increased thanks to the group work and they began to recover each other's shortages. After I began to revise the group studies formed during the experiments by following the steps in the TASC component of REAPS, I noticed that a more balanced communication process started to work. Thus, group discussions began to be organized around a scientific discourse in which scientific claims were justified and appropriate refutation elements provided.

Course of events (S2)	Interacted PCK components
Incident where she thinks she succeed Revealing the interests and needs of female students	KoL: Student interest/needs KoA: Concept maps, reflective journals KoIS: Concept maps, reflective journals
Why she thinks she succeed She shows the reason for using concept maps both as a teaching strategy and as an evaluation tool.	
Consequences for further teaching She says she plans to create a more effective individual learning monitoring system using portfolios in her next lessons.	

EE-S2: I only had two female students. I observed that they did not provide enough engagement during implementation. I noticed that they formed strong relationships with the core concepts in their concept maps although they did not ensure participation. When I read their reflective journals, I saw that they frequently talk about their learning difficulties and that they have started to learn better thanks to the journal. After this stage, I began reading the reflective journals after each lesson and taking notes. Thanks to those notes, I was able to estimate where they might have difficulties while drawing a concept map.

Course of events (S3)	Interacted PCK components
Incident where she thinks she succeed She believes that thanks to REAPS activities, she was able to provide knowledge building about the key concepts involved in each learning outcome.	STO: Conceptual change KoL: Misconceptions KoIS: TASC activities within the REAPS Model
Why she thinks she succeed She says that REAPS activities are a model that takes students' learning needs and interests into consideration.	
Consequences for further teaching She says she plans to use metacognitive strategies in her later lessons for her students to enable more meaningful conceptual learning.	

EE-S3: One of the situations that I did not expect to occur before the implementation but I witnessed as the implementation progressed was the fact that students generated ideas by constructing knowledge. I think the TASC component has a great effect on this surprise. I think, the fact that it is a model appealing to everyone increases the interaction and communication within the group. In this way, students may have had more opportunities to build knowledge. To see that they use the knowledge they construct to understand the events in their daily lives makes me happy.

4.3.1. Failed critical incidents

Course of events (F1)	Interacted PCK components
Incident where she thinks she failed She confessed that in the first weeks of the REAPS implementation she was not able to ensure that male and female students show a balanced engagement.	KoL: Student engagement KoC: Learning outcomes in electricity unit KoIS: Experiments
Why she thinks she failed She says that her aim is to uncover the pre-requisite knowledge of the students, but because of having poor knowledge of KoC, she made the wrong choices in choosing instructional strategies.	
Consequences for further teaching She says she will design an inquiry-based instruction to enable students to explore the learning outcomes in her next lessons.	

EE-F1: I was distributing problem scenarios during group activities or experiments and I asked them to solve problems together. I wanted them to study first individually and then as a group. Some students contributed a lot while others did not. Actually, while starting teaching, I thought they would all contribute. But I was not able to quite prevent this. I prepared the activities by correlating the learning outcomes in the program with the REAPS components. For students to acquire these outcomes, I expected them to discover the outcomes and key concepts during teaching. Maybe it was my fault.

Course of events (F2)	Interacted PCK components
Incident where she thinks she failed She thinks that she was not able to improve students' self-efficacy levels towards learning the science course.	STO: Beliefs regarding science learning and teaching KoL: Misconceptions KoIS: Experiments
Why she thinks she failed She states that students' positivist beliefs about learning science prevent them from understanding their misconceptions and that the experiments used could not change this situation.	
Consequences for further teaching In order to make experiments more effective, I will ask the school management to provide funding support to strengthen the physical conditions of the school and the laboratory.	

EE-F2: I don't think my students will be able to say "now we can easily learn science course" although the implementation was completed. Because even though I've performed so many activities, I noticed that students had constant confirmatory tendencies during

experiments, in particular. I realized that, during open-ended inquiries, on the other hand, I had to make more effort to motivate the students. Misconceptions occur more in abstract concepts such as electricity, compared to other concepts. Therefore, I can say that the experiments I used during the practices I conducted around everyday coping were ineffective in revealing and eliminating misconceptions.

Course of events (F3)	Interacted PCK components
Incident where she thinks she failed She thinks that she cannot adequately provide active learning, which is one of the requirements of the constructivist teaching approach.	STO: Didactics KoL: Misconceptions, engagement KoIS: REAPS activities
Why she thinks she failed She thinks she failed due to her not getting enough practicum in line with her teacher education program and that the few observations she made are mostly related to the lessons conducted with the traditional approach.	
Consequences for further teaching She states that she plans to apply student voice and authentic learning principles in order to create a classroom environment based on active learning.	

EE-F3: Before the implementation, I prepared activities for each component of REAPS. During these activities, I was heavily influenced by didactics, especially in some cases where there was a lot of SMK. I think this situation decreases the active engagement capacity of activities. Because I started to observe that the activities of the students for the group decreased and some students started to carry out the activities alone. Actually, I think this may be due to the fact that, before the implementation, I didn't know exactly what active participation is and what its principles are. During the internship, most of the teachers in the lessons we make observations were making traditional science teaching. Therefore, I was not able to develop my knowledge of active learning also at that time.

5. Discussion

The main purpose of this study is to examine thoroughly Beyza's, an experienced science teacher, teaching practice that she performs using the REAPS Model. In this context, various findings were reached as a result of the analysis and these findings were discussed separately by making use of the findings of the studies available in the relevant literature.

5.1. Discussion on the First Research Question

Findings regarding the question of "What were the participants' perceptions of her own REAPS implementation?" were discussed under this title. As a result of the content analysis, it was found that Beyza's perceptions about REAPS implementation were gathered under 9 themes. Various inferences can be made from the functional definitions of these themes (see Table 2).

Creating a student-centered learning environment is a pre-requisite for active learning (Pedersen & Liu, 2003). In these environments, students' learning experiences are designed and students are given the opportunity to construct knowledge (Wu et al. 2015). The first of the criteria that can be used in the control of meaningful learning opportunities offered by student-centered learning environments is engagement (Buncick, Betts & Horgan, 2001).

Similarly, it has drawn attention that Beyza primarily emphasizes engagement among these categories. This may be related to the fact that Beyza perceived the model as one of the active learning models. She stated that she believes that this model is beneficial in terms of affective and behavioral engagement as well as cognitive engagement. This statement is one of the situations mentioned in the related literature. As a matter of fact, active learning is a wide-ranging approach to learning that includes not only cognitive involvement of students, but also affective and behavioral engagement (Frederiks, Blumend & Paris, 2004). On the other hand, it was observed that Beyza stated that the active learning process accelerated especially with the effect of the TASC component. This finding is compatible with the theoretical background in the literature. TASC component is important in terms of being the propellent component of the REAPS Model (Ball & Henderson, 2008).

For students to solve problems related to their real-life situations, creative problem solving skills must be developed (Dondlinger & McLeod, 2015). It can be said that students who find solutions to their problems with their own thinking styles have more meaningful learning experiences. Similarly, real-life experiences and socialization were among the concepts that Beyza brought forward. During the interviews, she stated that she noticed that the REAPS implementation, which is also organized for the acquisition of life skills included in the program, has improved students' life skills. This is not surprising because the REAPS Model is an invaluable teaching model with any curriculum framework (Maker et al. 2015). This experience of Beyza is in harmony with the relevant literature. Because, the students, who structure knowledge through real-life experiences and solve related problems using their own creative problem-solving skills, are likely to develop life skills such as decision-making, analytical thinking, creative thinking, entrepreneurship, establishing communication, and teamwork, which are included in the science program in practice in Turkey. At this point, Beyza underlined that she especially associates the subjects from life with the lesson and includes them in problem scenarios. The fact that Beyza has the perception that the purpose of the model in terms of life skills is compatible with the aim of the program is important for the consistency of the implementation.

Beyza stated that while preparing the problem scenarios by being influenced by the DISCOVER component, students also pay attention to the characteristics of their own culture. Because, according to her, problem scenarios prepared in accordance with the DISCOVER component enabled students to face the problems in their own lives. This is important in order to provide the social context of teaching through multiple skills and Beyza aimed to teach multiple skills in accordance with DISCOVER (Maker & Schiever, 2010). It was remarkable that Beyza expressed the perceptions gathered under themes such as collaboration, intrapersonal skills and emotions, which emerged as a result of group work during the implementation of many other activities, by generally relating them to each other. She tried to establish heterogeneous groups for collaborative learning, gave importance to the continuity of communication within the group and mentioned that she observed the emotions and made new moves accordingly. In short, Beyza has a strong perception that learning experiences accompanied by positive emotions are provided in a collaborative teaching environment where the groups she formed develop intrapersonal skills. One of the themes that emerged in this process was argumentation. The fact that she frequently gets her students to perform debates and asks them to justify their claims was an important indicator in terms of ensuring the construction of knowledge through evidence-based inquiry and participation of even the most passive students in the argument formation process. It is likely that the argumentation course conducted by the first researcher of this study during Beyza's teaching program in previous years and the argumentation forms that Beyza prepared in that lesson had an effect on the occurrence of this situation. It can be said that this inference will be

effective in increasing the belief that REAPS model applications, which offer a discipline-specific teaching strategy, can be developed especially through teacher education programs.

To the best of our knowledge, there is no study on the REAPS implementation experiences of teachers other than one study examining student perceptions about REAPS implementation (Wu et al. 2015). It was observed that some of the themes obtained from this study were similar to the mentioned study (collaboration, intrapersonal skills, emotions), while some of them differs (engagement, real-life experiences and socialization, cultural context, physical conditions, argumentation and retention). It is thought that along with existing themes, emerged themes will provide new perspectives, especially in teacher education studies. Finally, it can be thought that the fact that Beyza has consistently implemented almost all of the theoretical background information regarding the REAPS implementation indicates that the fidelity of implementation is high (Alfaiz, 2019). Therefore, the realization of implementations in which new themes are addressed in studies based on the REAPS implementation and attention to their implementation reliability may increase the validity of the results obtained.

5.2. Discussion on the Second Research Question

The discussion on the question of "What is the participant's perception of the interaction among her own REAPS implementation and the PCK components that arise meanwhile?" was included under this title.

It would be useful to remember Beyza's general teacher profile before the discussion. Beyza's perceptions of her teaching were discussed in the context of the electricity unit. During the analysis, it was understood that Beyza's central orientation was everyday coping and that her students' priority was to associate the concepts on this topic with their daily lives. Besides, her peripheral orientation was didactics. Beyza used the REAPS implementation as a discipline-specific strategy. Developing multiple skills, social and communication skills, and finally, critical thinking skills within the scope of the DISCOVER component, as well as the learning outcomes in the program are among the teaching purposes, on the other hand. In summary, Beyza is an experienced science teacher who frequently uses the everyday coping orientation and occasionally uses traditional science teaching approaches.

Teachers should have firm understanding of all PCK components (Aydin et al. 2015). Examining the PCK Map of Beyza, it was seen that the most interacting PCK components with the others were KoIS (18), KoC (14), KoL (13), STO (10), and KoA (5), respectively. However, it may not be enough to comment on the number of interactions for each component alone. Instead, one should look at the interaction among components and their consistency (Loughran, Berry, Mulhall & Woolnough, 2006; Park & Chen, 2012). The most interaction in Beyza's Map was determined among KoL and KoIS components. This finding is similar to the findings in the literature (Akin & Uzuntiryaki-Kondakci, 2018; Park & Chen, 2012). The fact that interactions were particularly among KoL-KoIS components can be attributed to Beyza's being an experienced teacher. Because, the findings about PCK implementations of experienced teachers indicate that this interaction is much stronger than prospective teachers. From another angle, this situation can be evaluated in terms of ensuring PCK development by finding the opportunity of continuous teaching by teachers and enabling students to access KoL more easily. Researchers often mention that the interactions among these two components are particularly central to the interactions of experienced teachers (Aydin & Uzuntiryaki-Kondakci, 2018). It was found that the KoL and KoIS interactions showed the highest interaction among experienced teachers, regardless of the topic (Aydin & Boz, 2013). Similarly, Aydin et al. (2014) determined that KoC, KoL and KoIS components are topic-specific, while the KoA and STO components are not topic-

specific. The STO component did not change from topic to topic, because the STO was discipline-specific (Friedrichsen et al. 2009). Hence, Beyza, who carries out the discipline-specific REAPS implementation, may have relied on everyday coping throughout her teaching, as the model is directly related to the acquisition of life skills. The ideal orientation of Beyza was everyday coping, but she stated that didactics outweighed in the process. This is similar to the findings of Aydin et al (2014). Disconnection may occur between STO and KoIS because this is related to context and restrictions rather than just consistency in orientation. Teachers state that they want inquiry, but they attribute the reason for not having it to the education system (Aydin et al. 2014).

On the other hand, there are findings indicating that PCK Maps of experienced teachers are more integrated compared to prospective teachers. Unlike the findings of Akin & Uzuntiryaki-Kondakci (2018), Beyza's STO was broad and non-specific. This, as a matter of course, impacted the interactions among components, particularly among KoA and KoIS (Aydin & Boz, 2013; Park & Chen, 2012). Again, unlike the same study, the map of the experienced Beyza was fragmented. Similarly, teacher self-efficacy facilitates the interaction among components. Besides, at the center of the interaction, the triple interaction among KoC, KoL and KoIS was found (Park & Chen, 2012). This finding is consistent with the finding obtained from the study. Contrary to the findings of Park & Chen (2012), no interaction was seen among the KoA and STO components. Akin & Uzuntiryaki-Kondakci (2018) found that STO, KoL and KoIS interactions were more frequent and KoC and KoA interactions were less in the first maps of prospective teachers. It was observed that the least interaction in the other studies was among KoC and other components (Aydin & Boz, 2013; Park & Chen, 2012). Surprisingly, although the interaction among KoA and KoIS was undeveloped despite taking practicum, the most improvement was seen among KoC and other components. The findings that indicate the less interaction between KoC and KoA are consistent with the current study (Aydin & Boz, 2013). It was even found that KoA does not have a significant relationship with all components (Kaya, 2009). Beyza stated that she used the evaluation criteria based on general observations instead of validated evaluation criteria. When asked about the measurement rule, it seems that she confuses it with the learning outcomes. In conclusion, although she says she knows what she measures, it can be said that Beyza's evaluation knowledge is insufficient due to her failure to apply the measurement rule. On the other hand, the KoL knowledge significantly affects the components of KoA and KoIS (Park & Oliver, 2008b). Even if they sometimes detect their misconceptions, teachers do not tailor their teaching strategies (Park & Chen, 2012). Beyza confesses a similar situation, too. Therefore, weakness in the KoL component may have affected the KoA component.

Going a step further in mapping the interaction among PCK components and evaluating the general patterns obtained after constant comparisons, it was examined through the coding scheme developed by Demirdogen et al. (2016) whether binary interactions show consistency. This examination, made separately for the first and second interviews, was carried out under the hypothesis that low-level interacting components show disconnection and high-level interacting components show a connection in the PCK Map and that the STO component consistently influences the others. The examples nonconforming to this hypothesis were called contradictory examples.

As a result of the analysis of the first interview, it was found that the everyday coping central orientation consistently influenced the teaching of life skills take part in the program and the implementation of the REAPS Model, which is a discipline-specific instructional strategy. This finding is consistent with the findings in the literature indicating that the STO component has the ability to direct and influence other components. However, the KoC-KoIS

interaction showing medium interaction in the PCK Map was found to show disconnection in terms of the use of experiments. The following words of Beyza confirm this disconnection:

"*While developing activities for the REAPS Model, I made use of problem scenarios, concept maps and experiments. But, as they do not adequately activate inquiry skills, I think that experiments were not as effective as I would like.*"

Another disconnection between KoL-KoIS was found in the use of a question-answer strategy to activate pre-requisite knowledge. It was seen that during the interviews, Beyza frequently used a question-answer strategy after the introduction of the lesson was completed and she stated that she felt discomfort with this situation. In the rest of the interview, Beyza confessed that she was worried that too much question-answer interaction before the activities would damage the inquiry-based structure of the course. She stated that she was also worried that the lesson would be perceived as relatively teacher-centered because she often asked the questions herself. This is surprising because the Beyza's orientation is neither central nor peripheral. There are similar cases in the literature (Aydin et al. 2014). The evidence related to this point out that the orientation which teachers intend to use when planning the lesson and the orientations in practice may not be the same.

In conclusion, there were two contradictions during the first interview. While the STO-KoIS interaction, which only interacts twice in the PCK Map, is consistent contrary to expectations, the KoL-KoIS interaction presenting eight interactions showed disconnection. In light of these findings, it was concluded that taking place in the upper category with high-level interactions in the PCK Map does not guarantee to be consistent in another analysis framework. It can be said that one of the main factors that cause this result is that the interactions are considered the same in terms of strength in the PCK mapping process.

As a result of the analysis of the second interview, it was observed that similar to the findings in the first interview, the everyday coping central orientation has consistently influenced the identification of students' learning needs and revealing their pre-requisite knowledge. However, didactics orientation was found to show an inconsistent influence in terms of the teaching outcomes and handling outcomes in an inquiry-based manner. In contrast, everyday coping orientation has consistently influenced the teaching of the core concepts and the learning outcomes in the program. Another interaction was between the KoC-KoIS components. It was found that there were consistent relationships that multiple skills are taught through experiments, the materials proposed in the program are taught with circuit elements used in the classroom, and the learning outcomes are taught through activities. These consistent relationships continued their existence also in terms of KoL-KoIS and KoIS-KoA interactions.

More contradictions were encountered during the second interview. All of these contradictory consequences arose during interactions in the lower interaction category. Again, it was remarkable that almost all of these contradictions occurred between STO and KoA components and others. Considering that the components that show disconnection during binary interactions are generally STO components and while the few interacting components are KoA components, it can be interpreted that there is a link between these two consequences.

5.3. Discussion on the Third Research Question

Under this title, findings related to the question of "What do critical incidents indicate about the interplay between the various components of PCK?" were discussed in line with the relevant literature.

The fact that the two components interacted too much in the PCK Map do not guarantee that these components point to effective teaching (For example, KoC-KoIS 6 interactions). Binary relations under PCK Maps should be interpreted at the intersection of three or more components under critical incidents (Nilsson & Karlsson, 2019; Park & Chen, 2012). It was remarkable that KoL and KoIS components were included in all of the triple interactions that constituted the six identified critical incidents. It was an expected result to see KoL-KoIS interaction intensively in an experienced teacher like Beyza (Akin & Uzuntiryaki-Kondakci, 2018; Park & Chen, 2012). However, it is important that this situation has arisen regardless of the successful or failed critical incidents. Because it can be thought that using the perceptions of Beyza's performance as data, rather than observing her performance, ambiguated the transition between successful and failed critical incidents not significant in terms of increasing the possibility of confirmation bias.

Beyza stated that in successful critical incidents, she created a classroom environment suitable for group discussions, revealed the interest and learning needs of female students, and enabled the construction of knowledge around key concepts, respectively. In failed critical incidents, on the other hand, she stated that she was not able to provide a balanced engagement within the classroom, that she could not develop students' self-efficacy about science learning, and that she could not trigger active learning sufficiently. Departing from this point, it can be said that Beyza has the perception that she provided a classroom environment suitable for group discussions but could not create a balanced engagement in the classroom since she was not able to trigger active learning sufficiently. Surprisingly, it was observed that Beyza stated that she provided knowledge construction although she confesses that she was not able to adequately provide active learning. This situation indicates that there is a difference between PCK and enacted PCK, which is turned into performance especially in the planning phase.

It was seen that successful critical incidents were shaped around the STO that drive the KoL and KoIS components, and the KoC and KoA components that interact with them, while failed critical incidents were shaped around the STO, which drives the KoL and KoIS components, and the KoC component that interacts with them. It can be said that the fact that STO took place in both consequences indicates that it has both positive and negative effects on the critical incidents of Beyza's teaching. Contrary to the findings in the literature (Akin & Uzuntiryaki-Kondakci, 2018), this may provide evidence that her STO may begin to exhibit broad and non-specific characteristics during critical incidents that show at least triple interactions rather than binary interactions. For example, when asked about the most important characteristic of a teacher, Beyza said that it is to have a high level of SMK. Beyza stated that there was an inquiry among the objectives of the program during teaching and mentioned that this is the most important feature of science teaching. However, it was seen that in practice, Beyza did not design inquiry-based teaching and could not make an inquiry-based operational definition. However, it was observed that when asked about specific situations regarding electricity related to REAPS implementation, Beyza tended to give answers only based on the learning outcomes. This continued in the later parts of the interview and Beyza continued to state that her aim was to make her students gain inquiry skills. It can be said that this situation provides a clear example that pPCK does not guarantee ePCK. One of the underlying reasons may be that Beyza's STO is dominantly everyday coping rather than inquiry, and secondarily didactics. Beyza's discipline-specific strategy knowledge base can be interpreted as insufficient, as she considers the 5E model as teacher-centered. However, Beyza stated during the interviews that she was aware of using the REAPS model as a discipline-specific strategy in this practice. Lack of discipline-specific strategy knowledge may have negatively affected Beyza's teaching practice. Not having

inquiry orientation in terms of orientation and failure to make an operational definition of inquiry orientation can be considered as evidence for these inferences.

It was seen that two of these factors included student interests and needs, and one included revealing misconceptions. It was observed that engagement and misconceptions were central in the failed critical incidents. This situation may provide evidence that Beyza perceives her teaching as more effective in revealing interests and needs, and as less effective in providing engagement and revealing misconceptions. Beyza stated that to assume during the interview that participating students' pre-requisite knowledge was the same prevented her and pointed to the weakness of KoL. It was seen that the fact that the reflective process remained weak due to indirect teaching negatively affected science teaching based on students' prior knowledge. Thus, in the event of considering the KoL component as the starting point, the reflective cycle was seen to have a very important place in topic-specific science teaching.

When it is examined specific to the KoIS component, it was observed that the REAPS Model-originated activities were predominant in successful critical incidents, while experiments were predominant in the failed critical incidents. This consequence may suggest that Beyza associates the outputs arising from the practice with the REAPS Model, which is one of the contemporary teaching approaches according to her, while she associates other negative outcomes with experiments that are frequently used in traditional science education approaches and often conducted with positivist concerns. The fact that she stated during interviews that the experiments were not as effective as she wanted due to various impossibilities and that REAPS was insufficient to meet her goal of life skills development confirms this consequence.

6. Conclusion, Limitations and Recommendations

In accordance with the relevant research problems, the following general results were obtained in the study:

- It was concluded that Beyza's perception of the REAPS Model regarding student learning contribution was generally positive, that the implementation of the model had higher self-efficacy in the following weeks, and in addition to the findings from the previous study (Wu et al. 2015), that the practical experiences were expanded with the themes of engagement, real-life experiences and socialization, cultural context, physical conditions, argumentation and retention.

- In terms of the compatibility of REAPS Model implementation with the program, it was concluded that Beyza established KoC-originated analogies and she may also increase the KoL-KoIS interaction seen predominantly during implementations of possible individual development in this component.

- Because of the relatively high number of KoL interactions and consistent relationships seen in interactions involving KoL, it was concluded that Beyza's experience with REAPS implementation under the discipline-specific strategy was sufficient.

- In terms of determining that the most interaction was found in the interaction among KoL-KoIS components, it was concluded that Beyza made the implementation as a relatively experienced teacher in the name of general science teaching.

- It might be concluded that the fact that the purpose of the REAPS Model is to bring creative solutions to real-life problems pushed Beyza to choose everyday coping instead of inquiry.

- It was concluded that the self-efficacy level of Beyza has an effect on increasing the interaction among KoC, KoL and KoIS components.

- Similar to previous studies, it was concluded that the interaction of the KoA component with other components was weak.

- It was concluded that in most of the present binary interactions, STO consistently informed other components, and likewise, that most of the other binary interactions were consistent.

- It was concluded that critical incidents were effective in revealing the complex relationships between PCK components.

- It was concluded that Beyza's KoL-KoIS interaction, which was central to the PCK Map, continued to maintain this feature during critical incidents.

- It was concluded that contradictions can also be seen in KoL-KoIS interactions, which are frequently interacted in the PCK Map, and therefore, it would be more correct to interpret the contradictory consequences within the scope of critical incidents.

- It was concluded that patterns that are similar to the PCK Map patterns obtained from previous studies can also occur in-depth during semi-structured interviews where only perceptions about teaching performance are tried to be determined.

The results achieved are valid under various limits. In this study, interactions among binary components in the second research question and triple components in the third research question were taken into account. In further studies, these interactions may be mapped under multiple relationships. The obtained PCK Map is limited to the topic-specific PCK for the electricity unit of Beyza. The interaction numbers on the maps were determined in accordance with the self-report in which the semi-structured interviews were written on paper. This gives clearer information about the reported PCK, which is elicited through Beyza's perceptions of teaching performance, instead of the enacted PCK regarding performance. However, the interpretation of this experience goes beyond information obtained from reported PCK. Departing from this point, it can be said that deepening the perception of performance regarding teaching by observing the teaching performance or by video recording can give more accurate results. As a result of the positive perception of the REAPS Model, it can be suggested that the model should be used in the teaching of topics other than electricity in science courses at middle school level. In order to provide the PCK competence required by this teaching, it might be helpful to organize short and intensive programs where teachers can improve interactions among PCK components. Since the REAP Model has a limited implementation area in Turkey, just like the implementation of learning cycle teaching strategies, it can be ensured that academic community with REAPS teaching experience create REAPS implementation guidelines.

7. Conflict of Interest

The authors declare that there is no conflict of interest.

8. Ethics Committee Approval

The authors confirm that the present study needs ethics committee approval according to the research integrity rules in Turkey. Therefore, the authors obtained ethics committee permission form numbered 17/07/2020-6 for the study from Adiyaman University Human Research Ethics Committee.

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AN INVESTIGATION OF THE MIDDLE SCHOOL STUDENTS' MATHEMATICS EXAM ANXIETY AND SELF-EFFICACY FOR PROBLEM-POSING

Research article

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AN INVESTIGATION OF THE MIDDLE SCHOOL STUDENTS' MATHEMATICS EXAM ANXIETY AND SELF-EFFICACY FOR PROBLEM-POSING

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Abstract

The aim of the study was to analyze the mathematics exam anxiety and problem-posing self-efficacy of middle school students in terms of their school, gender, and grade levels, as well as the relationship among these parameters. The research was conducted with 37 fifth grade students, 53 sixth grade students, 72 seventh grade students, and 77 eight grade students; in total 239 students in two middle schools in Kayseri province, Turkey in 2019. The data collection tools comprised the "Mathematics Exam Anxiety Scale", developed by Şan (2014) and revised by Dulkadir (2017), and the "Problem Posing Self-Efficacy Scale", which was developed by Özgen (2019). For the analysis of the data the SPSS 25 package program was used. In the study, the reliability coefficient of the mathematics exam anxiety scale was found to be 0.486, and the reliability coefficient of the problem-posing self-efficacy scale was 0.942. Mathematics anxiety and problem posing self-efficacy did not differ significantly according to gender. A significant difference in mathematics exam anxiety was detected and the difference was between the fifth and seventh grades. No significant difference was found in the self-efficacy for problem posing at the grade levels. While mathematics examination anxiety showed a significant difference in terms of the schools, the self-efficacy for problem-posing did not differ significantly between schools.

Keywords: Mathematics, exam anxiety, problem posing, self-efficacy, middle school

1. Introduction

"Anxiety, which is an emotion gained through conditioning the approaches to learning approaches, encourages people to be creative and constructive at times, and sometimes prevents such behaviors in daily life." (Dursun & Bindak, 2011). Anxiety is often considered a bad feeling, but it may not always produce bad results. It can be thought that it is an advantageous situation for us to have an average level of anxiety. For this reason, it may not be the right way to worry about every job we take on, to be alarmed or to be carefree and ignore the consequences that will happen to us. If we want to achieve success, it may be suggested that we manage to keep our anxiety at a normal level.

Mathematics anxiety has an important place in mathematics teaching. Students' anxiety about mathematics may also begin to emerge when they start taking mathematics lessons in primary school. If the student does not begin to learn to keep this anxiety of mathematics from a young age at a normal level, his / her anxiety towards mathematics lessons may start to affect his success and the student can create prejudice against mathematics. It may also be very difficult to break this bias in the future.

"Exam anxiety is that the student feels restless and fails constantly before, during or after any exam." (Dulkadir, 2017). A student with low exam anxiety may not pay due attention to the exam result, and the good or bad results obtained may not have much meaning. On the other hand, students who have high exam anxiety may have a chance to succeed because of the stress caused by this anxiety and may have the problem of not achieving the success they want by putting obstacles in front of themselves. The importance given to central exams in our education system is increasing day by day by both parents and students. Anxiety levels of students started to increase in time because this importance is given to the exams. It is thought that the effect of mathematics is high in the exams, so mathematics exam anxiety is higher than other courses. Anxiety about mathematics may increase when students who are engaged in mathematics under normal conditions and have an interest in mathematics do not succeed in the exam, and this may lead to a decrease in emotions such as interest and curiosity towards mathematics along with mathematics achievement.

One of the remarkable topics of research in the field of mathematics teaching in recent years is the problem-posing (Özgen, 2019). Silver (1994) defined as "problem-posing can occur as editing an existing problem or creating new problems" (cited by Özgen, 2019). Problem posing studies are classified in different ways by different people. Different methods have been used in these studies, but it has been noticed that most of these methods have been done by going through a previously seen problem. Middle school students have difficulty in solving routine problems (Özgen, Aydın, Geçici, & Bayram, 2017). The reason why the students have such difficulties in creating a problem is that they do not encounter the problem questions in the teaching environment too much, they do not have the level of readiness to present original ideas. Problem-posing is a limited area, but its importance has been noticed in recent years and the studies in this area have increased (Kırnap-Dönmez, 2014). According to Bandura (1977), "self-efficacy can be defined as one's belief in the ability to successfully organize and carry out the activities and processes required to achieve a specific goal.". Students' self-efficacy also affects problem-posing skills. If a person believes in self-efficacy, it may be thought that (s)he may be safer when establishing a problem and will not hesitate to establish original problems.

Delioğlu (2017) examined math anxiety, exam anxiety, mathematics self-efficacy of the middle school eighth-grade students in terms of gender, grade level, eighth year achievement level, parental income status, parental education status attending the classroom/study center, and private lesson status. As a result of the research, no significant mean difference was found in terms of gender, parental education level of students, anxiety status of the students in the classroom/study center, and private lesson variables. However, a significant mean difference was found between exam anxiety and eighth grade achievement level. Students' exam anxiety was lower in the schools with a high eighth grade achievement level. When exam anxiety was examined according to the family income level variable, a significant mean difference was found. Exam anxiety decreased as the income level increased. There was also a significant mean difference in terms of exam anxiety and mathematics perception. Exam anxiety decreases as mathematics achievement perception increases. Yıldırım and Ergene (2003) examined how high school senior students' exam anxiety and social support on this subject affect academic success. As a result, exam anxiety negatively affects academic success for high school senior students. However, social supports such as family, friends, and teachers had positive effects on the academic success of the student. It was suggested that directing students to the guidance service to reduce anxiety experienced during the exam period would positively affect academic success. Işık and Kar (2012) examined the problem-posing skills of prospective elementary teachers. The number of prospective elementary teachers to establish different problems was at a low level. Prospective teachers had

difficulties mostly in remaining partition questions. Prospective teachers mostly focused on simple, not well-structured problems that can be solved with easy operations. In line with the data obtained, prospective teachers' problem-posing skills should be improved. Before starting the task, it is recommended to do the necessary activities for problem posing. Oğuz (2017) examined the relationship between pre-school teachers' problem-solving skills and teacher self-efficacy perception. Pre-service teachers' problem-solving skills and self-efficacy perceptions were found to be above average. When the relationship between pre-school teachers' problem-solving skills and self-efficacy perception was examined, there was a moderately meaningful relationship in a positive direction. Based on this, as the pre-school teachers' perception of self-efficacy increases, their problem-solving skills would increase. For this reason, it should not be forgotten that the positive development of pre-school teachers' self-efficacy perceptions would affect their problem-posing skills positively and activities should be given as much as necessary regarding self-efficacy. Boyraz (2019) examined prospective middle school mathematics teachers' problem-posing skills in equations. Pre-service teachers were given two unstructured, 14 semi-structured, and two structured problem-posing activities. Prospective teachers were generally successful in problem posing. While prospective teachers established two equations with unknowns, they had more difficulty than equations with one unknown. As the number of unknowns increases within the framework of the data obtained, they have difficulty in establishing problems. While prospective teachers were successful in structured problems, they had difficulty in establishing semi-structured problems. Teachers failed to convert the given graphics into problem sentences. Prospective teachers had difficulties in establishing problems suitable for real life. In line with this information, prospective mathematics teachers should be directed to problem-posing activities in the pre-service period. Işık (2011) made a conceptual analysis of the problems that prospective elementary mathematics teachers had set on multiplication and division in fractions. Prospective middle school mathematics teachers had difficulty in dividing fractions more than multiplication. Prospective teachers had experienced difficulties in the conceptual dimension of fraction and operations with fractions. it was recommended to prospective teachers who will teach students in the future, to eliminate their deficiencies in problem-posing, and to work on problem-solving suitable for real life. When the studies in the field are examined, there are few studies on mathematics exam anxiety at the middle school level. Furthermore, more studies were conducted on teachers and prospective teachers for problem-posing self-efficacy and that problem-posing self-efficacy was not explored with middle school students.

1.1. Aim of the Study

The study aimed to examine middle school students' exam anxiety and self-efficacy towards problem posing. According to Dulkadir (2017), it is necessary to take necessary measures before it is too late to know which level of mathematics exam anxiety is affected by which variables and to prevent this anxiety from decreasing academic achievement. With this study, exam anxiety was analyzed in detail and the basis for examining its effect on mathematics achievement was established. According to Özgen (2019), the relationship between problem-posing self-efficacy beliefs and problem-posing skills, problem-solving self-efficacy beliefs and skills can be revealed through quantitative approaches. In this study, the main research question is ***"What is the level of mathematics exam anxiety and problem-posing self-efficacy of middle school students?"*** Based on this main research question the sub-research questions can be stated as follows:

• Do middle school students' math anxiety and problem-posing self-efficacy differ significantly by gender, grade levels, and schools?

- Is there a relationship between middle school students' mathematics test anxiety and problem-posing self-efficacy scales?

2. Method

2.1. Participants

The research was conducted with a total number of 239 middle school students in two middle schools in Kayseri in the 2019. The participants were selected via convenient sampling method. The distribution of the students constituting the participants of the research according to gender, grade level, and schools are given in Table 1.

Table 1. *Distribution of students participating in the study according to gender, grade level, and schools*

Variable		f	%
Gender	Girl	112	46.9
	Boy	127	53.1
Grade Level	Fifth Grade	37	15.5
	Sixth Grade	53	22.2
	Seventh grade	72	30.1
	Eight Grade	77	32.2
School	A	178	74.5
	B	61	25.5
Total		239	100

2.2. Instruments

2.2.1. The Mathematics Exam Anxiety Scale

Mathematics Exam Anxiety Scale was developed by Şan (2014) as 20 items (reported by Dulkadir, 2017). Dulkadir (2017) created a 15-item scale by deleting some items and calculating the validity and reliability of the scale. The reliability coefficient of the new version of the 15-item scale was found to be 0.83. Seven of the items were classified as facilitating anxiety and eight as annoying anxiety. In the scale Four-Likert type, "never (1), sometimes (2), often (3), always (4)" was used. The Cronbach Alpha value of the scale was found to be 0.448. Since the reliability coefficient was less than 0.6, the scale was moderately reliable.

Kaiser-Olkin-Mayer (KMO) sampling adequacy scale was examined to see if the participants size of the mathematics exam anxiety scale was sufficient for factor analysis before analysis, and since KMO = 0.847> 0.6 condition was satisfied, the participants size was suitable for factor analysis (Bursal, 2019). Bartlett's Sphericity Test was used to see if the participants showed a normal distribution. According to the Barlett Sphericity test of the mathematics test anxiety scale, the participants showed a normal distribution ($X^2 = 139.569$, df = 105, p = 0.000). Figure 1 interprets the scree plot of mathematics anxiety. The scree plot is used to determine the number of factors (Özgen & Bayram, 2019). There are two factors according to the scree plot which is given in Figure 1:
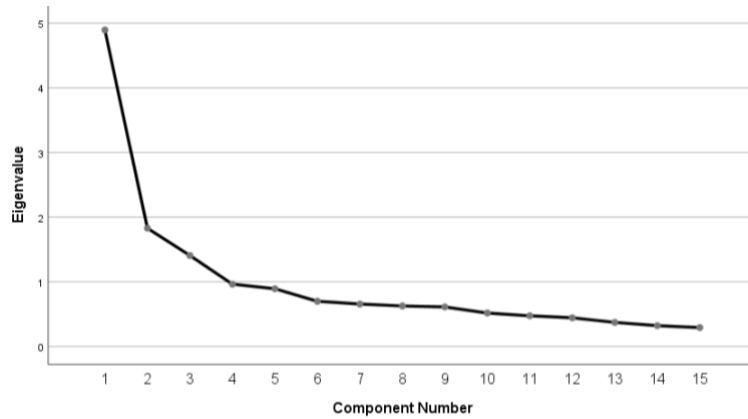
Figure 1. Scree plot of for mathematics exam anxiety scale

Factor analysis of the Mathematics Exam Anxiety Scale was run, and the rotated components matrix obtained from the analysis results are given in Table 2. According to the results of the factor analysis conducted on the mathematics anxiety scale, the scale had two factors. With the analysis, the 15-item scale was classified as seven items to facilitate anxiety and eight items to classify as difficult anxiety. Items containing facilitating anxiety were determined as items 6, 14, 9, 7, 8, 10, 15 of the scale. The items containing difficult anxiety were determined as items 5, 13, 11, 12, 1, 3, 2, 4.

Table 2. *Rotated components matrix results of mathematics exam anxiety scale (Turkish)*

Items	facilitate anxiety	difficult anxiety
"Matematik sınavlarına girmek beni mutlu eder."	0.792	
"Matematik sınavlarından zevk alırım."	0.780	
"Arkadaşlarımla matematik soruları çözme yarışması yapmaktan zevk alıyorum."	0.766	
"Matematik sınavlarına çalışmak bana zevk verir."	0.718	
"Matematik dersinin sınavları, matematiği daha iyi öğrenmemi sağlar."	0.688	
"Matematik sınavlarına hazırlanmaktan zevk alırım."	0.674	
"Sınavlarda ilk önce matematik testini çözmeye başlamak beni rahatlatıyor."	0.550	
"Matematik sınavı yaklaştıkça kendimi daha gergin hissederim."		0.682
"Matematik sınavlarında kendimi çok gergin hissederim."		0.678
"Matematik sınavlarında diğer sınavlardan daha fazla tedirgin olurum."		0.671
"Merkezi sınavlarda (TEOG, YGS, LYS) matematik testine bakmak bile istemem."		0.563
"Matematik sınavlarının geleceğim için çok önemli olmasını istemem."		0.528
"Matematik sınavlarında başarılı olabileceğimi düşünmüyorum."		0.513
"Matematik dersinden sınav olmayı tercih etmem."		0.489

"Merkezi sınavlarda (TEOG, YGS, LYS) matematik testi olmasa daha başarılı olurum."	0.355

2.2.2. Problem-Posing Self-Efficacy Scale

The problem-posing self-efficacy scale was created by Özgen (2019), consisting of 24 items in total, seven of which are negative (m1, m8, m12, m15, m17, m23, m24) and 17 of which are positive five-point Likert types. The items of the problem-posing self-efficacy scale include "strongly agree", "agree", "neutral", "disagree" and "strongly disagree" options. For this scale, Cronbach Alpha internal consistency reliability coefficient was determined as 0.942. In this study, Cronbach's Alpha value of the problem-posing self-efficacy scale was found to be 0.715. The scale is reliable because the Cronbach Alpha value is greater than 0.6. Factor analysis of the problem-posing self-efficacy scale firstly, KMO results were examined to see if our participants number was sufficient for factor analysis. Since the KMO sampling adequacy measure of the scale was met as 0.843> 0.6, the data obtained in the participants was suitable for factor analysis (Bursal, 2019). According to the Bartlett Sphericity test results (X^2 (276) = 1663.667, df = 276, p = 0.000), the participants satisfied normal distribution assumption. In Figure 2, four factor structure of the scree plot of problem-posing self-efficacy is examined to determine the number of graphs.
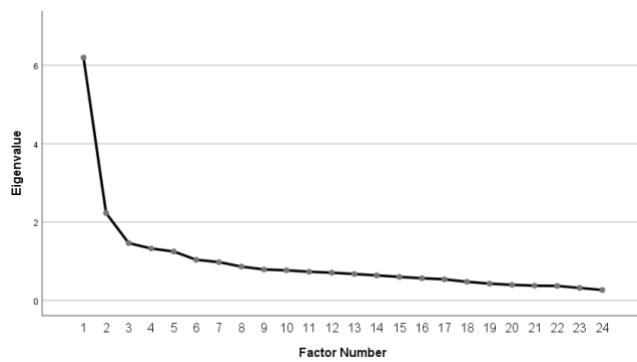
Figure 2. Scree plot of problem-posing self-efficacy scale

Table 3. *Rotated components matrix of problem-posing self-efficacy scale (Turkish)*

	Factors			
Items	1	2	3	4
"Problem kurma etkinlikleri ile matematik konularını daha kolay kavrarım."	0.642			
"Kurduğum problemlerin çözülebilir olmasını sağlayabilirim."	0.576			
"Bir matematiksel problemi çözmede başarılı olduğumdan, problem kurmada da başarılı olabilirim."	0.524			
"Problem kurma etkinlikleri sayesinde matematik derslerinde daha aktif olabilirim."	0.505			
"Matematik dersindeki yaratıcılık becerilerimi problem kurmada gösterebilirim."	0.434			
"Kapsamlı ve geniş bir matematik problemini daha küçük alt problemlere ayırabilirim."	0.349			
"Matematik derslerinde işlenen konu ile ilgili problemler kurabilirim."		0.614		
"Bir problemin sahip olması gereken niteliklere (verilen, istenen vb.) dikkat ederim."		0.597		
"Problem kurarken çözümünü düşünebilirim."		0.585		

"Yazacağım problemler için doğru matematiksel ifadeler, semboller, şekiller, birimler vb. kullanabilirim."	0.561
"Kendi yazdığım problemleri çözebilirim."	0.499
"Matematikte sözel/hikâye problemleri oluşturmada zorluklar çekerim."	0.661
"Resim, geometrik şekil ve grafik içeren problemler kurmada güçlük yaşarım."	0.580
"Çözümü verilen bir problemden yola çıkarak yeni ve farklı problemler oluşturamam."	0.574
"Belirli bir durum ile ilgili birden fazla problem kuramam."	0.546
"Verilen matematiksel işlemlere (toplama çıkarma vb.) uygun problemler kuramam."	0.424
"Öğretmenlerin ya da bir başkasının yardımı olmadan problem kuramam."	0.387
"Birden fazla yolla çözülebilen problemler yazamam."	0.323
"Matematik dersinde bir kavram, resim, şekil vb. verildiğinde bununla ilişkili yeni problemler oluşturabilirim."	0.645
"Bir problemdeki durumu değiştirerek yeni ve farklı bir problem geliştirebilirim."	0.607
"Bir matematik problemi kurarken, matematiksel problem çözme aşamalarını zihnimde canlandırabilirim."	0.472
"Yeni bir matematik konusunu öğrenirken problemler kurarak öğrenebilirim."	0.438
"Matematik dersinde öğrendiklerimi pekiştirmek amacıyla farklı problemler kurabilirim."	0.366
"Problem çözerken "Bu problem daha farklı olabilir miydi?" diye düşünüp problemi değiştirebilirim."	0.117

The rotated matrix from the factor analysis results of the problem-posing self-efficacy scale is given in Table 3. According to the results of the factor analysis, the scale has four factors. First factor with six items were named as mathematics and problem-solving. Second factor was named as the problem of problem-solving in mathematics with five items. Third factor was called as the problem of problem-solving in mathematics with seven items. Lastly, the fourth factor with six items was named mathematics during the learning process. 16, 18, 19, 20, 21, 22 items in the first factor, 3, 4, 5, 6, 7 items in the second factor 1, 8, 12, 15, 17, 23, 24 items in the third factor and 2, 9, in the fourth factor 10, 11, 13, 14 items were included.

We run factor analysis for arranging factor scores to run the analysis. The items were not loaded as the original scale so we could not take the factor scores. We added all item responses and find the total score for each student to run the analysis.

2.2.3. Procedure

In this study, it was aimed to determine mathematics test anxiety and problem-posing self-efficacy at the level of gender, grade level, and school. For this reason, the general survey method of the quantitative research method was used in the research. The survey pattern is used to describe old or new events. It also determines the level of people's thoughts, beliefs, and perceptions (Ary, Jacobs, Sorensen & Razavieh, 2010). While the dependent variables in the research are mathematics exam anxiety and self-efficacy in problem-posing, the independent variables are gender, grade level, and school.

3. Results

The data collected for the research were entered into the SPSS program and analyzes were made with the help of this program. Kolmogorov-Smirnov normality analyzes of mathematics exam anxiety and problem-posing self-efficacy scales were examined. Mathematics test anxiety scale [D (239) = 0.096, p = 0.000 <0.05] and the problem-posing self-efficacy scale [D (239) = 0.064, p = 0.02 <0.05] was not normally distributed.

3.1. Investigation of Middle School Students' Mathematics Exam Anxiety and Problem-posing Self-Efficacy by Gender

Kolmogorov-Smirnov normality test analyzes of mathematics exam anxiety and problem-posing self-efficacy scales were performed at the gender level. Kolmogorov-Smirnov normality test was used because the participants of the study was 239 people (n≥50). Girl students on math exam anxiety scale [D (112) = 0.89, p = 0.029] and boy students [D (127) = 0.128, p = 0.000] were not normally distributed. In the problem-posing self-efficacy scale, girl students showed normal distribution [D (112) = 0.056, p = 0.200], boy students [D (127) = 0.088, p = 0.018] did not show normal distribution.

Table 4. *Descriptive statistics of mathematics exam anxiety and problem-posing self-efficacy scales by gender*

Scale	Gender	n	$\overline{X}$	SD	Skewness	Kurtosis
Math exam anxiety	Girl	112	35.1696	6.47920	-0.191	0.742
	Boy	127	35.3386	5.85163	-0.419	0.607
Problem-Posing Self-efficacy	Girl	112	79.7946	10.17694	-.179	-0.226
	Boy	127	80.9449	12.09572	-.646	2.796

In Table 4, the skewness value is -0.191 and the kurtosis value is 0.742 for girl students in mathematics exam anxiety scale. The skewness value is -0.419 and the kurtosis value is 0.607 for boy students. Since skewness and kurtosis values are between +1 and -1, they showed normal distribution. The problem-posing self-efficacy scale has a skewness value of 0.520 and a kurtosis value of 1.420 for girl students. The skewness value for boy students is -0.226 and the kurtosis value is 2.796. Since the data did not take values between -1 and +1, it did not show normal distribution. The mathematics test anxiety scale shows normal distribution in line with the skewness-kurtosis values obtained at the gender level. Independent samples t-test analysis was conducted to see if there is a significant mean difference between girls and boys. The mathematics exam anxiety scale of middle school students [t (237) = 0.212, p = 0.832> 0.05] so there was no statistically significant mean difference between the means of girl and boy students. When the mean of the middle school students' mathematics anxiety scale was examined, the mean of the girls was 37.15 and the mean of the boys was 35.34 and there was no statistically significant mean difference between the means. Since the problem-posing self-efficacy scale did not show a normal distribution according to the normality tests conducted at the gender level, and Mann-Whitney U analysis was performed to see whether there was a significant mean difference between girls and boys. Mann-Whitney U results confirmed no significant mean difference between girls and boys (Mann-Whitney U = 7040.000, z = -0.135, p = 0.892).

3.2. Analyzing Mathematics Exam Anxiety and Problem-posing Self-Efficacy at the Level of Middle School Students

The normality test analyzes of mathematics examination anxiety and problem-posing self-efficacy scales are given in Table 5. Shapiro-Wilk (n <50) test was performed for the fifth grades. Kolmogorov-Smirnov (n> 50) test was carried out for the sixth, seventh, and eighth

grades. Fifth grades show a normal distribution in mathematics exam anxiety scale since p = 0.111> 0.05 in math exam anxiety scale. The sixth grades (p = 0.009 <0.05) and the seventh grade (p = 0.036 <0.05) and eighth grades (p = 0.192> 0.05) showed the normal distribution in math exam anxiety scale.

Table 5. *Kolmogorov-Smirnov normality test according to grade levels of mathematics exam anxiety and problem-posing self-efficacy scales*

Scale	Grade Level	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistics	df	p	Statistics	df	p
Math exam anxiety	5. grade level				0.952	37	0.111
	6. grade level	0.143	53	0.009			
	7. grade level	0.108	72	0.036			
	8. grade level	0.090	77	0.192			
Problem posing self-efficacy	5. grade level				0.945	37	0.066
	6. grade level	0.102	53	0.200			
	7. grade level	0.081	72	0.200			
	8. grade level	0.098	77	0.063			

The problem-posing self-efficacy scale of the fifth grades showed a normal distribution p> 0.05. Sixth (p = 0.200> 0.05), seventh (p = 0.200> 0.05) and eighth (p = 0.063> 0.05) grades showed normal distribution on the problem-posing self-efficacy scale. The mathematics test anxiety scale was not distributed normally at the grade level and the skewness-kurtosis values are given in Table 6.

Table 6. *Descriptive statistics of mathematics exam anxiety scale at grade level*

Scale	Grade Level	n	$\overline{X}$	SD	Skewness	Kurtosis
Exam anxiety	5. grade level	37	33.54	6.453	-0.515	0.29
	6. grade level	53	35.98	7.487	-0.11	0.356
	7. grade level	72	36.74	5.004	-0.58	0.797
	8. grade level	77	34.21	5.625	-0.237	0.829

When Table 6 is examined, the skewness value of the fifth grades was found to be 0.515 and the kurtosis value was 0.29 in the mathematics anxiety scale. The skewness value of the sixth grades was found to be -0.11, and the kurtosis value was 0.365. The skewness value of the seventh grade was found to be -0.58 and the kurtosis value was found to be 0.797. The skewness value of the eighth grades was found to be -0.237 and the kurtosis value was 0.829. Since the skewness-kurtosis values are between -1 and +1, we can assume that the math exam anxiety scale was normally distributed at the grade level.

As a result of the analyzes carried out, ANOVA examined whether there was a differentiation at the grade level since the mathematics exam anxiety scale and the problem-posing self-efficacy scale showed normal distribution. The homogeneity of variances of the mathematics exam anxiety scale was significant (F_{Levene} (3, 235) = 1.807, p = 0.147> 0.05). In this case, one of the Turkey or Scheffe tests can be used in multiple comparisons. Since the math exam anxiety scale is the result of ANOVA, there was a statistically significant mean difference between the grades of math exam anxiety [F (3, 235) = 3.454, p = 0.017 <0.05].

Table 7. *Mathematics exam anxiety scale Tukey test results*

(I) Grade level	(J) Grade level	Mean difference	Standard Error	p
5. grade level	6. grade level	-2.441	1.296	0.238
	7. grade level	-3.196	1.223	0.047
	8. grade level	-0.667	1.210	0.946

6. grade level	7. grade level	-0.755	1.095	0.901
	8. grade level	1.773	1.080	0.357
7. grade level	8. grade level	2.528	0.992	0.055

In Table 7, when the Tukey test results are analyzed, there is no significant mean difference between the mean of the fifth and sixth grades (p = 0.283> 0.05). There is a significant mean difference between the mean of the fifth and seventh grades (p = 0.047 <0.05). There is no significant mean difference between the mean of the fifth and eighth grades (p = 0.946> 0.05), sixth and seventh (p = 0.901> 0.05), sixth and eighth (p = 0.357> 0.05), seventh and eighth (p = 0.055> 0, 05).
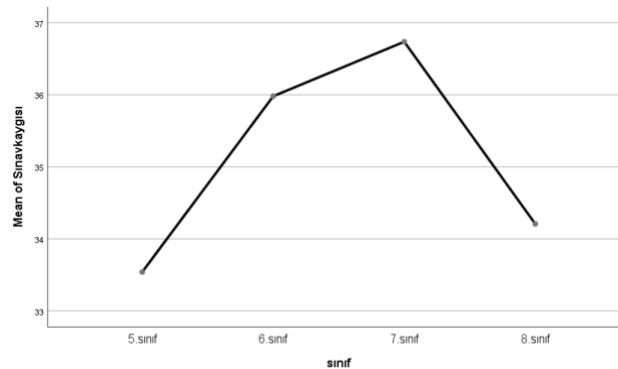

Figure 3. Math exam anxiety scale mean graph

Looking at the means of the fifth and sixth grades in Figure 3, although there seems to be a mathematical difference, there was no statistically significant mean difference according to the Tukey test result. Looking at the means of the sixth and seventh grades, there is no mathematically significant difference. Looking at the means of the seventh and eighth grades, there is a mean difference in mathematics, but according to the results of the Tukey test, there was no statistically mean difference. Looking at the mean of the fifth and seventh grades, there is a mathematical difference. At the mean of the fifth and eighth grades, there is no mathematical difference. At the means of the sixth and eighth grades, there is a mathematical difference, but there was no statistically significant mean difference in the Tukey test.

The homogeneity of variances of the Levene Test of the problem-posing the self-efficacy scale are homogeneous (F_{Levene} (3, 235) = 0.694, p = 0.557> 0.05). In this case, one of the Turkey or Scheffe tests can be used in multiple comparisons. There is no statistically significant mean difference between the means of the problem-posing self-efficacy of the classes in middle school [F (3, 235) = 1.365, p = 0.254 <0.05].

Table 8. *Problem posing self-efficacy scale Tukey HSD test results*

(I) Grade level	(J) Grade level	Mean difference	Standard Error	p
5. grade level	6. grade level	1.636	2.402	0.904
	7. grade level	3.525	2.268	0.407
	8. grade level	4.030	2.243	0.277
6. grade level	7. grade level	1.888	2.029	0.788
	8. grade level	2.394	2.001	0.630
7. grade level	8. grade level	0.505	1.838	0.993

According to Table 8, there is no statistically significant mean difference between the results of the Tukey HSD test, the means of the fifth and sixth grades ($p = 0.904 > 0.05$), fifth and seventh grades ($p = 0.407 > 0.05$), and the fifth and eighth grades ($p = 0.27 > 0.05$). There is no statistically significant mean difference between the means of the sixth and seventh grades ($p = 0.788 > 0.05$) and the sixth and eighth ($p = 0.630 > 0.05$) and seventh and eighth ($p = 0.93 > 0.05$) grades.

Figure 4. Problem-posing self-efficacy scale mean graph

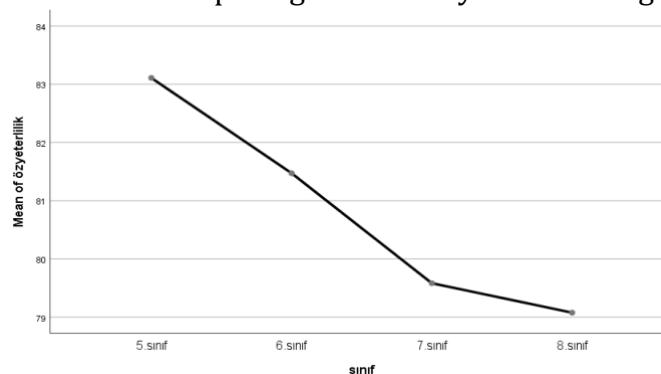Looking at the mean of the fifth and sixth grades in Figure 4, there is a mathematical difference, but there was no statistically significant mean difference according to the Tukey HSD test. Looking at the means of the sixth and seventh grades, there was a mathematically significant difference, but there was no statistically significant difference according to the Tukey HSD test. Looking at the means of the seventh and eighth grades, that there was no mathematical difference. Looking at the mean of the fifth and seventh grades, there is a mathematical difference, but according to the results of the Tukey HSD test, there was no statistically significant difference. Looking at the mean of the fifth and eighth grades, there was a mathematical difference, but according to the results of the Tukey HSD test, there was no statistically significant difference. Looking at the mean of the sixth and eighth grades, there was a mathematical difference, but according to the results of the Tukey HSD test, there was no statistically significant mean difference.

3.3. Analysis of Middle School Students' Mathematics Exam Anxiety and Problem-posing Self-Efficacy According to Schools

To examine the differentiation of mathematics exam anxiety and problem-posing self-efficacy according to schools, it was first examined whether mathematics exam anxiety and problem-posing self-efficacy were normally distributed according to schools. Kolmogorov-Smirnov normality test was used in the research since A Middle School was 178 people and B Middle School was 61 people ($n \geq 50$). A Middle School did not show normal distribution in mathematics test anxiety scale [$D(178) = 0.09$, $p = 0.001$] but B Middle School had a normal distribution [$D(61) = 0.106$), $p = 0.085$]. A middle school did not show normal distribution in the problem-posing self-efficacy scale $D(178) = 0.071$, $p = 0.031$]. Contrariwise, B Middle School showed a normal distribution $D(61) = 0.096$, $p = 0.200$]. Since the math exam anxiety scale and problem-posing self-efficacy scale did not show a normal distribution according to schools, the skewness-kurtosis values given in Table 9 were examined.

Table 9. *Descriptive statistics of mathematics exam anxiety and problem-posing self-efficacy scales according to school*

Scale	School	n	Mean	SD	Skewness	Kurtosis
Exam anxiety	A Middle School	178	36.17	5.908	-0.242	0.936
	B Middle School	61	32.59	6.076	-0.444	0.043

Problem posing self-efficacy	A Middle School	178	80.22	-0.357	2.286
	B Middle School	61	80.87	0.029	-0.005

Table 9 shows the skewness kurtosis values of mathematics exam anxiety and problem-posing self-efficacy scales according to schools. On the scale of the mathematics exam anxiety scale, the skewness value of A Middle School was found to be -0.242 and the kurtosis value was 0.936. In the mathematics exam anxiety scale, the skewness value of B Middle School was found to be -0.444 and the kurtosis value was 0.043. Since the skewness and kurtosis values range from -1 to +1 on the mathematics exam anxiety scale, we can assume that the mathematics exam anxiety scale was normally distributed according to schools. The problem-posing self-efficacy scale found that A Middle School had a skewness value of -0.357 and a kurtosis value of 2.286. The problem-posing self-efficacy scale found that B Middle School's skewness value was 0.029 and the kurtosis value was -0.005. The problem-posing self-efficacy scale did not normally disperse since the skewness and kurtosis values were not between -1 and +1. According to the analyzes, the mathematics exam test anxiety scale showed a normal distribution according to the schools in line with the skewness-kurtosis values. Independent samples t-test analysis was conducted to examine the differentiation of mathematics exam anxiety scale with respect to A Middle and B Middle Schools. Since the independent samples t-test results of the mathematics exam anxiety scale were analyzed, there was a statistically significant mean difference between the means of A Middle School and B Middle School [t (237) = 4.060, p = 0.000 <0.05]. The mean of A Middle School was 36.17 and the mean of B middle school was 32.59. When the means were analyzed, there was a mathematical difference between A Middle School and B Middle School.

The problem-posing self-efficacy scale was found not to show a normal distribution according to the normality tests conducted at the school level and the Mann-Whitney U test was applied to see if there was a significant mean difference between A Middle School and B Middle School. In the results of the Mann-Whitney U test, there was no significant mean difference between the means of A middle school and B middle school (Mann-Whitney U = 5287, z = -0.305, p = 0.760).

3.4. Relationship Between Mathematics Exam Anxiety and Problem-posing Self-efficacy

When the results of Spearman correlation analysis conducted to determine whether there was a significant relationship between middle school students' mathematics exam anxiety and problem-posing self-efficacy, the problem with the mathematics exam anxiety scale was calculated because the p-value was less than 0.05 in the direction of r = 0.135, p = 0.037. There was a significant relationship between establishing a self-efficacy scale. Since r value was 0.135 <0.3, there was a positive weak relationship (Büyüköztürk et al., 2011).

4. Discussion and Conclusion

The study examined the mathematics exam anxiety and problem-posing self-efficacy of middle school student in relation with their gender, grade level, and the school. As a result of analyzing in the research, the mean of mathematics exam anxiety of middle school students was found to be 37.15 for girls and 35.34 for boys. When the means were examined, there was a mathematical mean difference, but according to the results of the analysis, there was no statistically significant mean difference between the mathematics exam anxiety of boys and girls. Tuncer and Yılmaz (2016) found in their study with 225 middle school students in math anxiety did not differ significantly by gender. Poyraz (2012) determined that math anxiety was higher in the eighth-grade students than seventh-grade students, those who did not like mathematics, and parents with low education level had higher levels of anxiety than parents

who had higher education level, but found that there was no significant difference according to gender. Oksal, Durmaz, and Akın (2016) examined the exam and math concerns of 708 middle school students who prepared for the national exam at the gender level. According to the analysis, the exam anxiety of girl students was higher than boy students.

In the examination of the problem-posing self-efficacy scale according to the gender, there was no statistically significant mean difference between girls and boys. Özgen, Aydın, Ertürk-Geçici, and Bayram (2017) examined whether the problem-posing skills of the eighth-grade students differed by gender. The problem-posing skills of the eighth grades did not vary according to gender. Akkan, Çakıroğlu, and Güven (2009) examined the problem-posing skills of their sixth and seventh grade students according to gender. Girls' problem-posing skills are slightly better than boys (cited by Özgen, Aydın, Ertürk-Geçici, and Bayram, 2017). Semizoğlu (2013) examined the problem-posing skills of fifth graders according to gender. There was a significant mean difference between the problem-posing skills of girls and boys. The mean of the girls is found to be more than the boys and the problem posing skill differs in favor of the girls.

Another result of the research is that mathematics exam anxiety showed a statistically significant mean difference in middle school students according to the grade level. The means were examined to see at which grade levels the differentiation emerged because of the analyzes and the anxiety in mathematics showed a significant mean difference for the 5th and 7th grades. Looking at the mean of the grade levels, there was no differentiation at 5-6, 5-8, 6-8, 7-8 grades. Dursun and Bindak (2011) examined the mathematics exam anxiety of middle school students according to different variables. Mathematics exam anxiety showed a significant mean difference according to grade levels. With the multiple comparison test, the eighth-grade students who went to the last grade are more anxious than other students. Dede and Dursun (2008) examined the anxiety levels of elementary school students at the grade level, math anxiety did not show a statistically significant mean difference compared to the grade levels. However, even though there was no statistical mean difference in the direction of the means, anxiety increased as the grade level grew mathematically. Sapma (2013) wanted to examine the relationship between mathematics anxiety and mathematics achievement of high school students. He also included differentiation of math anxiety according to grade level. Mathematics anxiety showed a statistically significant mean difference according to the grade levels. In line with the examinations made at the grade level, the level of anxiety increases as the grade level increases.

Problem-posing self-efficacy did not show a significant mean difference at grade level by examining problem-posing self-efficacy according to gender. Studies on examining problem-posing self-efficacy at the gender level were generally conducted on prospective teachers. Yenice (2012) examined prospective teachers' self-efficacy levels and problem-solving skills. Self-efficacy did not show a significant mean difference at the grade level, while the problem-posing skill showed a significant difference at the grade level. Genç and Kalafat (2007) examined the prospective teachers' democratic attitude and problem-solving skills in terms of various variables. Problem-solving skill is a significant mean difference according to grade level. In the research, the problem-solving skill of the fourth-grade students was expected to be higher, while the problem-solving skill of the third-grade students was found to be higher. This result may be related to job anxiety and stress experienced by senior students.

Another finding of the research is that, according to the analyzes, mathematics exam anxiety showed a significant mean difference according to the schools. When the mean is analyzed, the mean of the A Middle School (state) was 36.17 and the mean of the B Middle

School (private) was 32.59. Analysis of the means confirmed that there was a mathematical mean difference between the two schools in favor of A Middle School. Yenilmez and Özbey (2006) examined the mathematics anxiety of elementary school students studying in private and public schools. Mathematics anxiety did not differ significantly in private and public schools. Savaş, Taş, and Duru (2010) investigated how mathematics achievement changed between schools. Students studying in private schools are more successful than students in public schools. Students at public school may experience more anxiety because of less success.

As a result of examining the problem-posing self-efficacy according to the schools, self-efficacy did not show a significant mean difference in private and public schools. Uysal (2007) examined the relationship between problem solving skills, anxiety, and attitudes. He investigated how the school factor affected his problem-solving skills. There is no significant mean difference between the problem-solving skills of the students studying in public school and private school. It is concluded that there was not much study on the examination of problem-posing self-efficacy according to the school variable.

Another subject of the research is to examine the relationship between mathematics exam anxiety and problem-posing self-efficacy. There was a significant relationship between mathematics exam anxiety and problem-posing self-efficacy. The relationship is a weak and positive relationship.

The research was limited to two middle schools in Kayseri, one private and one state. By expanding the research participants, more general results can be achieved. In the study, mathematics exam anxiety and problem-posing self-efficacy were examined according to gender, class, and school. Expanding the research can be provided by examining different variables. To reduce students' math exam anxiety, activities can be organized by teachers and the level of anxiety can be tested again. Furthermore, considering the importance of problem posing skills, problem-posing activities can be given more place in secondary school students.

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Ethics Committee Approval

The ethics committee approval was received from Erciyes University (28.04.2020).

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EFFECTIVENESS OF UTILIZING SCENARIO-BASED INSTRUCTION TO TEACH "FUNCTIONS" TO HIGH SCHOOL STUDENTS IN MATHEMATICS CLASSES

Research Article

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Abstract

The aim of this study was to investigate the effects of teaching the subject of "Functions", utilizing scenarios associated with everyday life, to high school students in terms of their academic achievements. The study was carried out with twenty 10th grade students at a high school in a district of Bartin, Turkey in the 2018–2019 school year. In the study, which was based on the Mixed Methods, a weak quasi-experimental design with one pre-test and post-test group, was employed. Function achievement test (FAT) and semi-structured student interview form (SSIF) were used as data collection tools. During the study, scenarios and activities with the examples of daily life related subject of functions were applied for a period of 8 weeks. In the research, the quantitative data were analyzed via the Wilcoxon Signed-Ranks Test, and the qualitative data were analyzed using the coding technique. As a result of the analyses, it was observed that there was a significant difference between the pre-test and post-test scores in favor of the post-test.

Keywords: function, high school students, use of scenarios, mathematics, achievement

1. Introduction

Mathematics in everyday life is considered to be a product of the efforts of human beings to understand nature (Olkun & Toluk-Uçar, 2007). It is possible to see mathematics in all areas of life (Hacısalihoğlu, Mirasyedioğlu, & Akpınar, 2004). The fact that mathematics is the core of all sciences and that it is needed in all areas of life makes mathematics education significant. Regular, understandable, and practicable mathematics education can be provided starting in primary school. Although the importance of mathematics education is known in Turkey and necessary regulations have been made in mathematics curriculums from time to time, the desired level of success has not yet been achieved. The prominent indicator of this fact is that our students have not shown the desired improvement in international exams such as the Trends in International Mathematics and Science Study [TIMSS] and Programme for International Student Assessment [PISA]. One of the most important reasons for this is that mathematics taught in schools has not been associated with everyday life (Çağırgan-Gülten, Ilgar, & Gülten, 2009; Karakoç & Alacacı, 2012, 2015). According to Karakoç and Alacacı (2015), the students have not performed well in international exams such as the TIMSS and PISA because they were not familiar with the questions related to everyday life. Çağırgan-Gülten et al. (2009) investigated high school students' opinions about their using mathematics subjects in everyday life; they found that the students did not have sufficient knowledge about the use of mathematics in everyday life. The vast majority of students expressed that everyday life examples were not

taught during the lessons and that they believed that experiencing everyday life examples in mathematics lessons would contribute to their learning (Çağırgan-Gülten et al., 2009).

One of the standards of mathematics education recommended by the National Council of Teachers of Mathematics [NCTM] (2000) is associating mathematics with everyday life and using mathematics in this context. It was expressed that using real-life contexts in mathematics lessons increases students' motivational levels and gives them the ability to apply mathematics to their daily life (Gainsburg, 2008; Sorensen, 2006, as cited by Karakoç & Alacacı, 2012). It was emphasized that real-life examples being related to students' experiences and realistic is important for the quality of mathematics education (Van Den Heuvel-Panhuizen, 2003).

It is important to incorporate real-life problems in mathematics lessons based on the statement that "real-life problems are included" in learning outcomes of the current curriculum (MoNE, 2018). Özaltun-Çelik & Bukova-Güzel (2019) stated that mathematical learning activities including real-life situations revive students' mental activities and foster associations between concepts and symbols.

The foundation of the constructivist approach is to activate learning by doing and experiencing. How an individual learns and constructs knowledge in his mind is more important than what he knows. Scenario-based instruction is one of the constructivist teaching methods. In this method, scenarios in which real-life related problems are fictionalized initiate learning. Scenarios are designed to attract students' attention, to arouse their curiosity, and to be ill-structured. In addition, the main purpose of scenarios is to help students reach the desired learning goals within the process (Musal, Akalın, Kılıç, Esen, & Alıcı, 2002). In this process, it is essential to question students' learning processes by asking questions to trigger their higher order thinking skills (Delisle, 1997). This instruction is based on a thorough understanding which provides learner-centeredness and active learner participation; it motivates learners and fosters their problem-solving skills, and it is based on problem-solving (Major & Palmer, 2001). The NCTM (2000) described instruction on problem-solving as an effective way of teaching mathematics. In this process, students are first presented with a problem situation. They subject the problem to various processes and try to reach the desired result. Because there are multiple ways to solve a problem, students are encouraged to take part in active learning and cooperation. Scenarios, which are used as an educational tool and contain a problem situation, are planned as stories that embody various real or real-like problems that may attract students' attention, preoccupy them about these problems, prompt them to solve the problems, and equip them with the ability to achieve required learning outcomes (Cantürk-Günhan, 2006). The students' investigating, questioning, searching in groups, and exploring the problem situations designed with scenarios of ill-structured daily life problems would contribute to their learning of the topic (Hendry, Ryan, & Harris, 2003).

The constructivist approach has been adopted and implemented in education in Turkey since 2005. The concept of function was associated with other disciplines, and different usage and application areas were provided in the rearranged secondary education curriculum (MoNE, 2018). The concept of function is one of the building blocks used in almost all areas of mathematics, and it is quite important for explaining, understanding, and using mathematical expressions (Eisenberg, 1991). The importance of expressing rules and definitions regarding the concept of function, of showing functions with multiple representations, of establishing relationships among these representations, and of giving examples from different application areas was emphasized in the curriculum (MoNE, 2018). The purpose of relational thinking is not reaching a mathematical answer but showing mathematical expressions in different ways and using the main features of these expressions (Yavuz-Mumcu, 2018). Relational understanding and thinking foster conceptual understanding skills that emerge in the process of

learning mathematics and help enrich images related to concepts in the mind (Hiebert & Lefevre, 1986; Van de Walle, Karp, & Williams, 2012).

According to Argün, Arıkan, Bulut, and Halıcıoğlu (2014), the concept of function is the core of mathematics. In other words, it is at the core of almost all areas of mathematics, and it is a unifying concept functioning as a scaffold in mathematics. The development of a proper understanding regarding the concept of function requires understanding the relationship network of the concept thoroughly. However, according to Eisenberg (1991), different representations used for the presentation of functions and the existence of many sub-concepts of this concept are among the basic factors making it difficult to understand. In real life, functions come up with matches. Hence, teaching functions ought to be started with real-life modeling and needs to be developed with the idea of matching (Argün et al., 2014). Although the concept of function has been described in various ways depending on its epistemological development, these descriptions reflect similar thoughts in content. However, there are some differences as well. The first of these is the fact that "there is a correlation between two variables; that is, there is a change in the dependent variable with the change in the independent variable," while the second is the thought of function constructed on the concept of set.

In today's modern mathematics books, the concept of function is defined as a special pattern making matches between the elements of two sets. Accordingly, the definition of function based on the concept of set is given as "Let A and B be two non-empty sets and f be a relation from A to B. If f relation matches each element in set A to just one element in set B, this relation is called a function from A to B." Another definition of a function is that it is a dynamic process that converts inputs to outputs (Bayazıt & Aksoy, 2013). It has been suggested that the most influential approach for teaching functions and graphs is "concept-oriented instruction." This is because the multiplicity of thoughts and representations related to the concept of functions and factors such as cognitive levels and previous experiences of student groups can make learning this concept difficult (Bayazıt & Aksoy, 2013). Gaining and improving conceptual knowledge depends on making associations between concepts (Hiebert & Lefevre, 1986). Teachers ought to provide students suitable learning environments and opportunities to facilitate their learning. Associating the concept of function with daily life situations can contribute to conceptual learning. When teaching the concept to students, simply giving them the definition of functions and solving sample problems within the discipline are not sufficient for learning the concept. It is necessary to study solutions of problems which necessitates thinking of functions in combination with other disciplines and daily life examples (Bayazıt & Aksoy, 2013). In the current study, prepared scenarios and activities associate the topic of functions and function graphs with students' daily lives.

There are several national and international studies on functions in the literature (Bayazıt & Aksoy, 2010; Özaltun-Çelik & Bukova-Güzel, 2019; Clement, 2001; Tekin, Konyalıoğlu, & Işık, 2009). The studies carried out at the secondary education level about this topic were mostly case studies aiming to identify students' perceptions and views about the concept of function (Özgen, Aygün, & Hanazay, 2017; Yavuz & Hangül, 2014). It has been stressed that students had difficulties and misconceptions about the ways functions were represented and the relationships between them (Karahasan, 2010; Uygur-Kabael, 2010). Similarly, students have difficulty in determining if the patterns given are functions and in switching between representations (Akkoç, 2006). Vinner (1992) stated that students had the misconception that "a function should be given as a unique rule, its graph must be constant, and a function must be one-to-one," and they generally thought that a function had to contain some algebraic formulas (as cited by Yağdıran, 2005).

Karataş and Güven (2003) expressed that high school students and preservice teachers were unable to relate between different representations of functions, and the students were not able

to decide if the statements given were functions or not. Evangelidou, Spyrou, Elia, and Gagatsis (2004) mentioned in their study, which was about recognizing functions and giving examples from real life, that a great majority of the students used the expression "a function is one-to-one" while defining the concept of function. In these studies, it was revealed that the concept of function is difficult to understand for students from all levels, and that it is one of the subjects that can easily confuse students. In addition, it was suggested that one of the reasons that students have difficulty with functions is that the concept is abstract by nature depending on its epistemological structure (Bayazıt, 2010).

In Turkey, cluster mapping, sets of ordered pairs, graphs, and algebraic representations regarding the concept of function are contained in course books within the curriculum (MoNE, 2018). Upon finishing secondary education, students need to be able to use functions easily to define mathematical relations (NCTM, 2000). Some everyday life examples using functions and function graphs include input-output and factory-product relation, mechanical physics problems including speed, time and orbital problems, piecewise functions and practices, and grade calculations, etc. (Karakoç & Alacacı, 2015). Graphical representation of functions is not limited to mathematics knowledge and the topic of functions. According to Monk (2003), graphics are communication tools used for expressing knowledge in different forms and instructional tools used to contribute to students' thorough understanding of the concepts (as cited by Tekin et al., 2009). Furthermore, graphics provide convenience and clarity for organizing, summarizing, interpreting, and presenting the data (Taşar, İngeç, & Güneş, 2006).

It is evident from the results of previous studies that it is necessary to be careful in the teaching of a subject that can easily mislead students and to relate the concept of functions to known concepts and to make concept-oriented lessons with examples from daily life. The research focused on the use of scenarios in teaching functions and graphics was not found in our literature search. The reason for choosing the topic of function and its graphics in the current study was that it is difficult for students to understand, and it is one of the subjects that can be misleading (Akkoç, 2006; Bayazit,2010; Bayazit & Aksoy, 2013; Evangelidou et al., 2004; Karataş & Güven, 2003; Vinner, 1992, as cited by Yağdıran, 2005). In addition, the topic of functions constitutes the basis for learning other topics as specified in the secondary education curriculum. It is proposed that instruction implemented by relating this concept to previously learned concepts and everyday life would facilitate learning. Therefore, in the current study, we investigated the impact of instruction using scenarios prepared by associating the topic of functions and function graphs with daily life on the mathematics achievement of 10th graders. For these reasons, the current study contributes to the existing literature. In this study, the instruction was carried out by using problem situations (scenarios) and activities created from daily life related to the topic of functions and function graphs. The problem situations were presented by associating them with daily life, and answers to the following sub-problems were sought:

1) Does teaching implemented with scenarios on functions make a significant difference between the pretest and posttest scores of 10th grade students?

2) What are the 10th grade students' response categories for the questions in the test on functions learned by instruction with scenarios?

3) What are the views of 10th grade students regarding the method implemented while teaching the topic of functions?

2. Methodology

In this study, the Mixed Methods based on both quantitative and qualitative data was employed. According to Rossman and Wilson (1994), two methods supporting and confirming each other provides an opportunity for a detailed and developed analysis and correcting the

deficiencies by synthesizing the two methods creates an opportunity for better reliability of the study. Two reasons for using the two methods together are complementarity and expansion. Quantitative and qualitative data are designed to complement each other as well as to expand the limits of the research (Giannakaki, 2005; as cited by Butgel-Tunalı, Gözü, & Özen, 2016). In the current study, using these two methods together provided both complementarity and expansion features. Therefore, quantitative and qualitative methods were employed together in this study for enriching the research, for making more detailed explanations about the research, and for assessing the implementation process as well as the implementation result. Quasi-experimental design was employed in the evaluation phase of the study. The experimental designs are used to determine the cause-effect relationship between the variables (Büyüköztürk, 2007). Examining different conditions existing in the research and not being able to select participants is defined as a quasi-experimental design (Creswell & Clark, 2015).

2.1. Participants

Participants of the research consisted of twenty 10th graders, 12 females and 8 males, from the middle socioeconomic level studying at Multi-Program Anatolian High School located in a district of Bartın, Turkey. The students voluntarily took part in the study. Instead of the students' real names, codes such as S1, S2, …, S20 were used. The research was conducted in the 2018–2019 academic year.

2.2. Data Collection Tools

The FAT, aiming to gauge impact of the method implemented, the scenarios and activities prepared for teaching the topic, and the semi-structured interview form (SSIF), aiming to explore students' opinions, were employed as data collection tools.
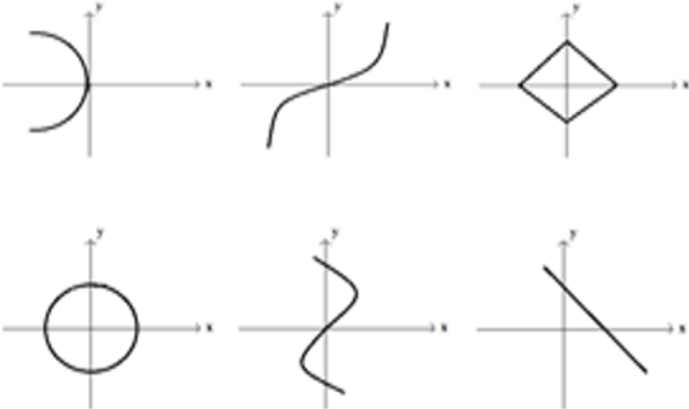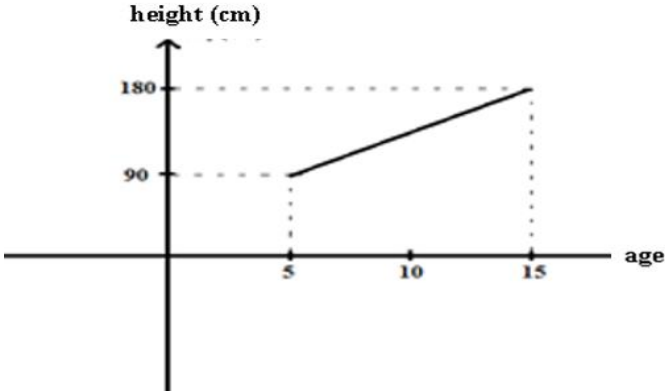
2.2.1. Function Achievement Test (FAT)

A 21-item FAT containing open-ended questions was prepared by making use of mathematics teaching books (Altun, 2010; Baki, 2018; Uygur-Kabael, 2017) and related literature (Cantürk-Günhan, 2006). The learning outcomes related to the topic of functions and graphics included in the secondary education mathematics curriculum (MoNE, 2018) and considered for test preparation were presented in Table 1. FAT questions with representative student answers are included in the Findings section. Content validity of a measuring tool is understood by getting experts' opinions on whether the questions of the measurement tool are suitable for measuring purpose and whether they represent the area to be gauged (Karasar, 2005). To determine the content validity of the questions in the FAT, two content-area experts and two mathematics teachers working at the high school were consulted in terms of content, level, and language, and a pilot application was performed with 15 students. One of the test questions from the pilot application was not understood by the students and led to different perceptions; this question was removed from the test. Following the pilot application, the necessary corrections were made, and it was decided that one lesson hour was enough for answering the test questions. Thus, the final form of the FAT contained 20 open-ended questions (definition of function: 4 questions, types of function: 4 questions, inverse of the function and combination of function: 4 questions and functions graphs: 10 questions). The FAT was applied to the same group as a pretest and a posttest. The questions in the FAT were evaluated by expert review, necessary corrections were made, as a result of the pilot study, and thus the validity of the research questions were ensured. The sample questions of the FAT were given in Table 2.

Table 1. *Learning outcomes regarding the topic of functions and graphics (MoNE, 2018)*

1. The Concept of Function and Its Representation	1.1. Students can solve problems about functions, 1.2. can draw graphs of functions, 1.3. can interpret graphs of functions and make representations of real-life situations that can be expressed with linear functions,
2. Combination of Two Functions and Inverse of a Function	2.1. can make applications about one-to-one and covering functions, 2.2. can make operations regarding the compound process in functions, 2.3. can find the inverse of a given function.

Table 2. *Sample questions of the Function Achievement Test*

Subject	Question
Definition of Function	Please write whether the graphics given below are functional or not, together with their reasons.
Types of Functions	A new store was opened in a small town. The name of the store is "Crazy Variety Store," and the writing *"Everything is 5 TL!"* on the store window highly attracts people. Accordingly, draw a product-price graph of function reflecting this situation made to attract customers, and determine the type of this function. The graphic in the figure shows height of a boy from 5 to 15 years old. Then, how old does this child have to be to become 160 cm?
Function Graph	Zehra, who drives to İstanbul from Bartın for a summer holiday, consumes 25 TL of fuel when she travels at the speed of 90 km per hour. The fuel consumption increases at the rate of $\frac{1}{5}$ when the car moves 5 km/h faster. Accordingly, draw a graph of Zehra's fuel consumption depending on the speed of her car.

2.2.2. Semi-Structured Interview Form (SSIF)

A five-item SSIF was prepared by the researchers upon getting experts' opinions in order to explore the students' views about the method implemented, and the students were asked to write their answers. In addition, one-to-one interviews were made with six students. The content analysis was conducted by evaluating the data obtained with the codes and categories constructed by the researchers.

2.3. Empirical Study Process

The experimental group consisting of 20 students was divided into 5 groups—4 students per group. The classroom setting was rearranged in order to facilitate communication of the group members and to help them work more comfortably with each other. The students had been informed about the method to be implemented before implementation, and they were informed about tasks to be completed during the study by the students and the teacher. The study lasted for 8 weeks (50 lesson hours). Five scenarios and four activities were implemented in the experimental group. The FAT was administered as a pretest before and a posttest after the implementation. The students were asked to write their views about the method implemented, and one-to-one interviews were carried out with six of them.

2.4. Data Analysis

Quantitative data analysis techniques were employed to reveal if teaching the topic of functions by associating it with everyday life caused any statistically significant differences between pretest and posttest scores of the students.

The analysis of the 20-question Function Achievement Test (FAT), which was prepared as open-ended by the researchers, was done with quantitative data analysis techniques. Research data was obtained by examining students' answer sheets. For this, firstly, the correct answers of the students to open-ended questions were scored as 1, and the incorrect and unanswers were scored by the researchers as 0. Then, due to the small number of students in the group, the analysis between dependent groups was carried out using the non-parametric test Wilcoxon Signed-Ranks Test, using the SPSS 22.00 statistics program.

 Then, the answers given by the students to the FAT were scored by two researchers as completely correct, partially correct (a), partially correct (b), incorrect, and unanswered by considering the framework of Şahin, Erdem, Başıbüyük, Gökkurt and Soylu (2014) given in Table 3. To provide reliability of the study, scoring was performed by two researchers, and consistency percentage was calculated according to Miles and Huberman (1994). The consistency percentage found was 93%. The researchers agreed on their discussions for the remaining 7% difference. Hence, perfect consistency between the coders (100%) was provided. Second, frequency values of students' pretest and posttest answers related to these codes aiming to determine their mathematics achievement levels were interpreted in tables, and direct examples of students' answers were given.

The analysis of qualitative data obtained from the interview form prepared for answering the third sub-problem of the research was performed by content analysis. The aim of content analysis is to reach concepts and relations that would explain the data gathered. The data are conceptualized, organized logically, and themes explaining the data are detected (Yıldırım & Şimşek, 2018). The data of the current study were classified into codes and categories by the researchers, and the consistency percentage found was 95% according to Miles and Huberman (1994). For the remaining 5% difference, the researchers agreed upon their discussions. Thus, full consistency (100%) was achieved by increasing the consistency between the coders.

Table 3. *The codes for the students' responses and scoring values corresponding to these categories*

Response Category	Completely Correct	Partially Correct (a)	Partially Correct (b)	Incorrect	Unanswered
Scoring Values	4	3	2	1	0

As can be seen in Table 3, a 5-point grading system related to the students' responses was employed. These were **Completely Correct:** correct responses containing all of the scientific ideas regarding the questions; **Partially Correct (a):** responses containing nearly all correct scientific ideas regarding the questions with minor errors; **Partially Correct (b):** responses that are nearly incorrect with few accurate scientific ideas; **Incorrect:** responses that are lacking in accurate scientific ideas regarding the questions and unrelated to the questions; and Unanswered: the questions that are left blank. The questions in the FAT were coded as Q1, Q2, …, Q20.

3. Research Questions

The main research question of the study was "What is the effect of utilizing scenario-based instruction to teach "Functions" to high school students in Mathematics classes?" Based on this main research question, the sub-research questions are as follows:

1.   "Does teaching implemented with scenarios on functions make a significant difference between the pretest and posttest scores of 10th grade students?"

2.   "What are the 10th grade students' response categories for the questions in the test on functions learned by instruction with scenarios?"

3.   "What are the views of 10th grade students regarding the method implemented while teaching the topic of functions?"

4. Findings

The findings related to the analysis of the students' responses to the questions in the FAT about the topic of functions.

4.1. Findings Related to the First Sub-Research Question

The findings related to the first sub-research question "Does teaching implemented with scenarios on functions make a significant difference between the pretest and posttest scores of 10th grade students?" are given in Table 4.

Table 4. *Wilcoxon Signed-Ranks Test results of FAT scores before and after the implementation*

Posttest-Pretest	N	Mean Rank	Sum of Ranks	z	p
Negative Ranks	0	.00	.00	3.92*	.000
Positive Ranks	20	10.50	210.00		
Ties	0	-	-		

*Based on negative ranks

The Wilcoxon signed-ranks test results aiming to reveal whether teaching the topic of functions with scenarios significantly affected the students' mathematics achievement were presented in Table 4. The results indicated that there was a significant difference between the students' pretest and posttest FAT scores ($z = 3.92$, $p < .00$). When mean rank and sum of ranks were considered, it was seen that the difference was in favor of negative ranks, that is, of the

posttest scores. These results showed that teaching the topic of functions with scenarios improved the students' mathematics achievement levels.

4.2. Findings Related to the Second Sub-Research Question

Analysis of the qualitative findings related to the second sub-research question "What are the 10th grade students' response categories for the questions in the test on functions learned by instruction with scenarios?" is presented in Table 5.

Table 5. *The categories and frequencies regarding the students' responses for the questions in the pretest and the posttest about the definition of function*

Questions	Pre-test					Post-test				
	Q1	Q2	Q4	Q5	f(%)	Q1	Q2	Q4	Q5	f(%)
Categories										
Completely correct	4	1	-	8	13(16.25)	11	1	3	10	25(31.25)
Partially correct (a)	3	-	2	-	5(6.25)	2	3	9	3	17(21.25)
Partially correct (b)	4	6	7	4	21(26.25)	4	11	5	4	24(30.00)
Incorrect	5	7	5	3	20(25.00)	2	3	-	2	7(8.75)
Unanswered	4	6	6	5	21(26.25)	1	2	3	1	7(8.75)
Total					80 (100)					80(100)

-: no data in the relevant category.

The categories, frequencies, and percentage distributions of the responses given to the questions in the pretest about the definition of function were shown in Table 5. According to the table, 51.25% of the student responses in the pretest were in the categories of incorrect and unanswered. In these categories, the students mostly gave incorrect responses to Q1, Q2 and Q4, respectively. It was understood that the students had serious knowledge deficiency in determining whether there was a function when they were given a function graph. In this context, S2's response is given in Figure 1.
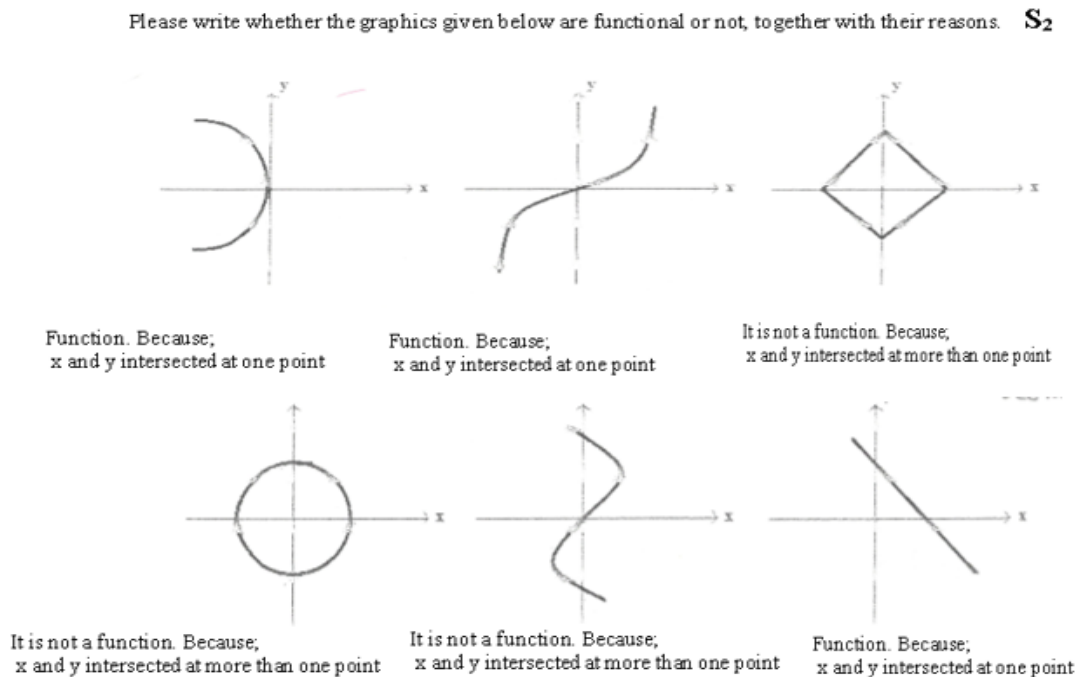

Figure 1. S2's partially correct (b) response to Q1 in the pretest

Based on the answers given in Figure 1, it can be said that S2 does not know the definition of function exactly, that is, does not have the knowledge that each x value in the domain needs to match one and only one element in the image set. In addition, while the student had to apply the vertical line test, he decided whether there was a function by looking at how many times x and y axes intersected in the graphs given. Although this method used by the student gave the correct result in some graphic questions, the student's response was regarded in the category of partially correct (b) as the method was wrong.

S3-Q2: Which of the expressions given below is a function? write the reasons.

S3-Q2

$f\colon \mathbb{Z} \to \mathbb{N}, f(x) = 2x + 1$, When we put any integer in place of x, it becomes a natural number, so it is a function.

$g\colon \mathbb{Q} \to \mathbb{Z}, g(x) = x$, I think this is wrong, so it is not a function. For example, when you put $\frac{1}{3}$ it becomes $\frac{1}{3}$ because there is a one-to-one difference, but it is not an integer.

$h\colon \mathbb{Z} \to \mathbb{R}, h(x) = \sqrt{x+5}$ Since R is for real numbers, this is also function.

$k\colon \mathbb{R} \to \mathbb{R}, k(x) = \frac{3}{4x+6}$ It is wrong. That is, it does not specify a function. Because it cannot be

$x = -\frac{3}{2}$

Figure 2. S3's partially correct (b) response to Q1 in the pretest

According to Figure 2, S3 answered the definition of algebraic relations as "the definition of functions and codomains" regardless of f and h relations. Therefore, the student's response was regarded in the category of partially correct (b). Bourbaki (1939) described function as a special relation making matches between elements of two (as cited by Markovits, Eylon, & Bruckheimer, 1986). The definition of function in today's modern mathematics books is as follows: "Let A and B be two non-empty sets, and f be a relation from A to B. If f relation relates every element in set A to one and exactly one element in set B, this relation is called as a function from A to B." Based on this definition, none of the expressions given for the question can be a function.

The categories, frequencies, and percentage distributions of the students' responses to the questions about the definition of function in the posttest were also given in Table 5. According to the table, 82.5% of the student responses were completely correct, partially correct (a), and partially correct (b). It was seen from Table 5 that the number of incorrect responses decreased considerably in the posttest compared to the pretest. Most of the students applied the vertical line test accurately in the graphic questions. Accordingly, completely correct posttest answers of S2, whose response to Q1 was partially correct (b) in the pretest, are given in Figure 3.

S2-Q1: Please write whether the graphics given below are functional or not, together with their reasons

It is not a function.
Because when we draw the line, it crosses at 2 points.

Function. Because when we draw the line, it cuts at 1 point.

It is not a function.
Because when we draw the line, it cuts at 2 points.

It is not a function. Because when we draw the line, it cuts from 2 different points.

It is not a function. Because it cuts at 2 points.

Function. Because it cuts at 1 point.
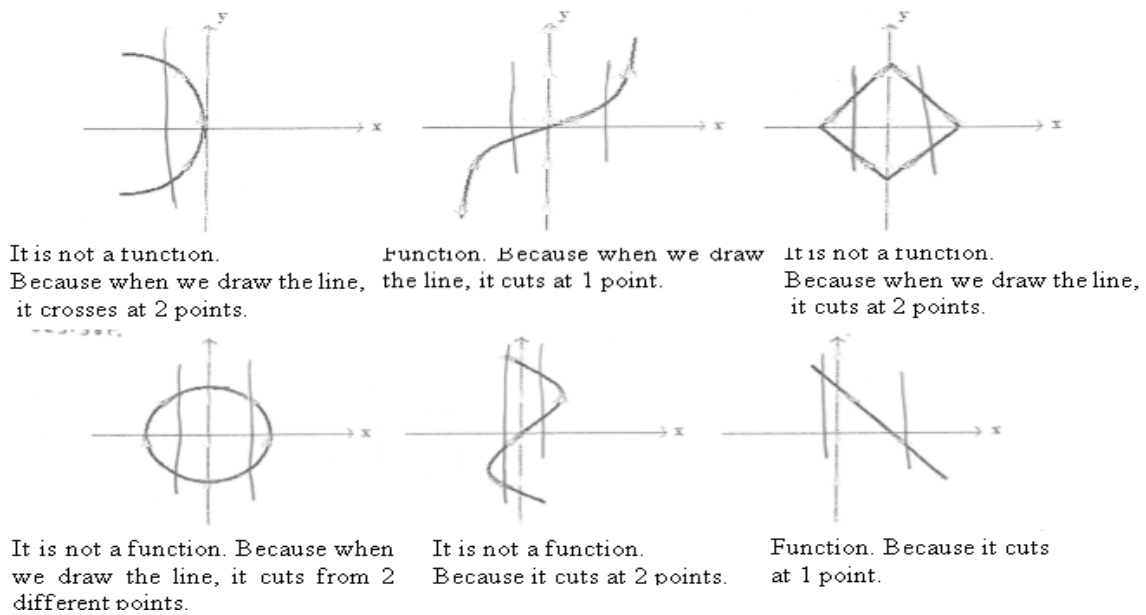
Figure 3. S2's completely correct response to Q1 in the posttest

As can be seen in Figure 3, S2 applied the vertical line test and expressed that if a vertical line drawn in the graphics cross the graphic at one point, it is a function, but it is not a function if it crosses more than once. On the other hand, as illustrated in Table 5, the students had deficiencies in deciding whether an algebraic expression given was a function or not. In this context, the response of S9, who was the only one to answer Q2 correctly in the posttest, was presented in Figure 4.

S9-Q2: Which of the expressions given below is function? write the reasons.

$f: \mathbf{Z} \rightarrow \mathbf{N}, f(x) = 2x + 1$, It is not a function. The negative number placed in turns out to be negative again. But it must be a Natural number. That is, not every number in the definition set is in the image set.

$g: \mathbf{Q} \rightarrow \mathbf{Z}, g(x) = x$, It is not a function. A rational number from the definition set turns out just like itself. But it has to be an integer.

$h: \mathbf{Z} \rightarrow \mathbf{R}, h(x) = \sqrt{x + 5}$ It is not a function. If the result is negative when a negative number is placed in, it is not a function because of the root 2

$k: \mathbf{R} \rightarrow \mathbf{R}, k(x) = \frac{3}{4x+6}$ It does not specify a function. If the real number $x = -\frac{3}{2}$ is thrown in, the denominator becomes zero (0). So it does not specify a function.

Figure 4. S9's completely correct response to Q2 in the posttest

Table 6. *The categories and frequencies regarding the responses of the students for the questions about types of functions in the pretest and posttest*

	Pretest			Posttest		
Questions	Q3	Q6	f(%)	Q3	Q6	f(%)
Categories						
Completely correct	-	4	4(10.00)	7	16	23(57.5)
Partially correct (a)	10	-	10(25.00)	8	3	11(27.5)
Partially correct (b)	9	-	9(22.50)	4	-	4(10.00)
Incorrect	-	8	8(20.00)	1	-	1(2.5)
Unanswered	1	8	9(22.50)	-	1	1(2.5)
Total			40(100)			40(100)

-: no data in the relevant category

Table 6 contains the categories, frequencies, and percentage distributions of the responses given to the questions about types of functions in the pretest and the posttest. According to the table, 35% of the student pretest responses were in the categories of completely correct and partially correct (a). It was noteworthy that students wrote 'composite' or 'entire' functions when determining the types of functions in the questions given by the table representations. It was clear that they did not know much about the concepts of unit and constant functions. The response of S20 given in Figure 5 exemplifies this fact.

S20-Q6

6)A new store was opened in a small town. The name of the store is "Crazy Variety Store," and the writing *"Everything is 5 TL!"* on the store window highly attracts people. Accordingly, draw a product-price graph of function reflecting this situation made to attract customers, and determine the type of this function.
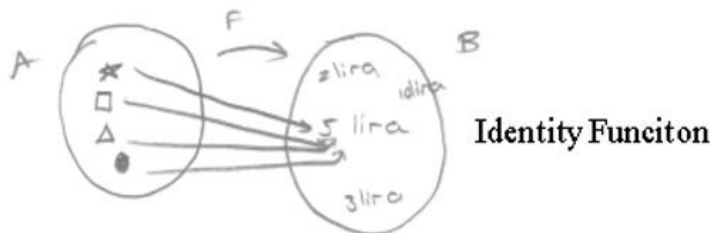
Figure 5. S20's incorrect response to Q6 in the pretest

According to Figure 5, S20 showed the situation given in the 6th question via cluster mapping accurately, yet his response was regarded in the incorrect category since he was not able to determine the type of function and to illustrate this on a graphic.

The categories, frequencies, and percentage distributions of the student responses for the questions about types of functions in the posttest were also presented in Table 6. According to the table, 85% of the student responses were in the categories of completely correct and partially correct (a). Most of the students responded to Q6, which was left blank by only one student, in the category of completely correct. S1's response was given in Figure 6. Additionally, 85% of the students responded to Q3, which was about types of functions, in the categories of completely correct or partially correct (a). Thus, it can be concluded that the students became successful in determining the types of functions following the implementation of scenario-based instruction.

S1-Q6

6)A new store was opened in a small town. The name of the store is "Crazy Variety Store," and the writing *"Everything is 5 TL!"* on the store window highly attracts people. Accordingly, draw a product-price graph of function reflecting this situation made to attract customers, and determine the type of this function.
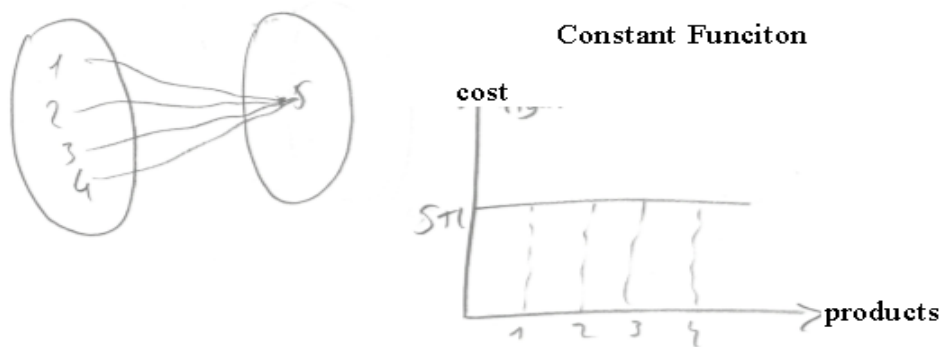

Figure 6. S1's completely correct response to Q6 in the posttest

When S1's response in Figure 6 was analyzed, it was seen that the student wrote the type of function correctly and supported it with cluster mapping and table representation of the graphic. Therefore, S1's response was regarded as completely correct.

Table 7. *The categories and frequencies regarding the student responses for the questions in the pretest and posttest related to operations in functions, inverse of the function, and combination of functions*

	Pretest					Posttest				
Questions	Q9	Q18	Q19	Q17	f(%)	Q9	Q18	Q19	Q17	f(%)
Categories										
Completely correct	1	-	17	-	18(22.50)	4	2	20	7	33(41.25)
Partially correct (a)	1	-	1	1	3(3.75)	6	-	-	6	12(15.00)
Partially correct (b)	8	1	2	-	11(13.75)	6	-	-	4	10(12.50)
Incorrect	2	12	-	1	15(18.75)	3	14	-	2	19(23.75)
Unanswered	8	7	-	18	33(41.25)	1	4	-	1	6(7.50)
Total					80(100)					80(100)

-: no data in the relevant category.

The categories, frequencies, and percentage distributions of the student responses for the questions in the pretest about operations in functions, the inverse of functions, and the combination of functions were given in Table 7. According to the table, 60% of the student responses were in the categories of incorrect and unanswered. While doing addition, most of the students disregarded the knowledge of "operations can be performed only with functions when domains of functions are the same (common)" by thinking of the definition of a composite function. S11's response to Q9 was given in Figure 7.
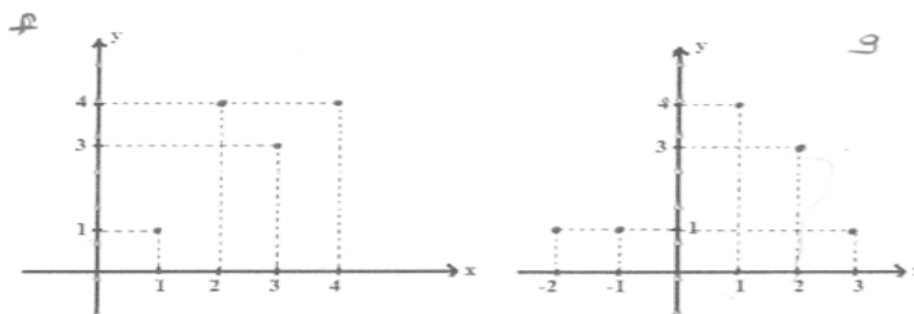
Figure 7. S11's incorrect response to Q9 in the pretest

It was seen in Figure 7 that S11 performed the operation without determining domains of functions in the ninth question in the pretest. He performed the operation by writing equality as $(f + g)(1) = f(g(1))$ although he was expected to write equality as $(f + g)(1) = f(1) + g(1)$. S11 was not able to distinguish the topics of addition in functions and determination of compounds in functions. In addition, he neglected the fact that function g was not defined at the x=4 point

and that the g (4) value could not be counted. However, most of the students wrote x=3 in set C without writing the rule of function in order to find the value at the point of x=3 for the 18th question about the composite process of functions. In this context, S5's response was given in Figure 8.
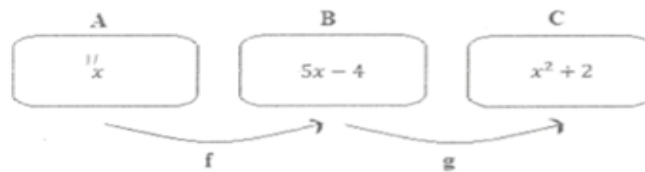
Figure 8. S5's incorrect response to Q18 in the pretest

S5 should have written the domain and codomain of the functions f and g with the rules of functions as f: A→B, f(x)=5x-4 and g: B→C, g (5x-4) = x^2+2. However, Figure 8 indicated that S5 wrote 3 although he should have written 1 for x in set B for function g, as he thought that the g (3) value was required to be found. Contrarily, S5 should have solved the question by considering what value needed to be written instead of the x value for equalizing (5x-4) to 3. Therefore, S5's response was regarded as incorrect.

The categories, frequencies, and percentage distributions of the student responses for the questions in the posttest about operations in functions, the inverse of functions, and the combination of functions were given in Table 7. According to the table, 68.75% of the student responses were in the categories of completely correct, partially correct (a), and partially correct (b). A majority of the student mistakes were eliminated, and the students gained the knowledge that the four basic operations can be performed only in functions having a common domain. S10's response in Figure 9 reflected this situation. It was seen in Figure 9 that S10 first identified domains of the functions and then added up in the functions. He responded to the question correctly by expressing that the function g was not defined at the point of x=4 and that the value of g (4) could be undefined in (f + g) (4) = f (4) +g (4). Therefore, S10's response was regarded as completely correct.

S10-Q9: The graphics below belong to the f and g functions, respectively.
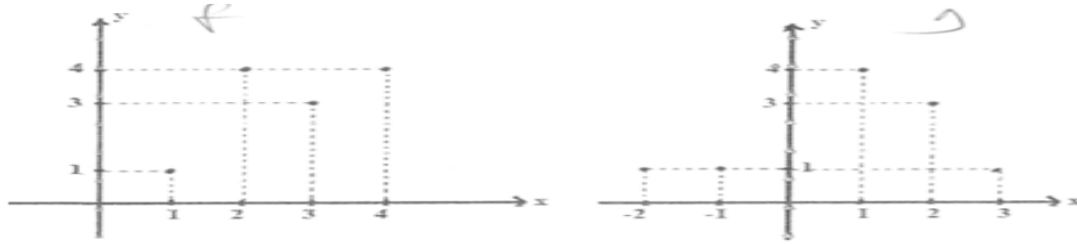
a) Write the domains of the f and g functions.

a. f ve g fonksiyonlarının tanım kümelerini yazınız.

(f) tanım = 1, 2, 3, 4   (g) tanım = -2, -1, 1, 2, 3

b) $(f + g)(1) =$
     $(f + g)(2) =$
     $(f + g)(4) =$

Find the values respectively.

b. $(f+g)(1) = 1 + 4 = 5$

     $(f+g)(2) = 4 + 3 = 7$

     $(f+g)(4) = $ bulunmaz

     $(f+g)(4) = $ **undefined**

c)   Is there a result you can't find? If there is, what would be the reason for this? Please explain.

c.   Bulamadığınız bir sonuç var mı? Eğer varsa sizce bunun sebebi ne olabilir?

Açıklayınız.

$|f + g|(4) = $ bunun cevabı (f) grafiğinde var iken (g) grafiğinde yok.

The answer to this: While it is present in graph (f), it is absent in graph (g).

Figure 9. S10's completely correct response to Q9 in the posttest

The response of S3, who was the only one with the completely correct score in the posttest, was given in Figure 10. It was understood that the students had difficulty in the 18th question for which no completely correct response existed. However, S3 answered the 18th question correctly by providing reasoning. Therefore, S3's response was regarded as completely correct.
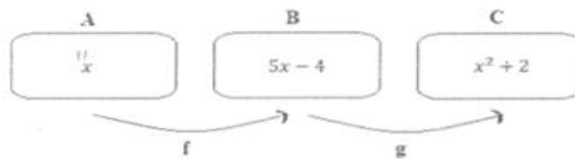
S3-Q18: Above, f function from A to B and g function from B to C are defined.

Yukarıda A dan B ye f; B den C ye ise g fonksiyonları tanımlanmıştır.
Buna göre (fog)(3) değerini bulunuz.

$5x - 4 = 3$
$5x = 7$
$x = \frac{7}{5}$

$g\left(5 \cdot \frac{7}{5} - 4\right) = \left(\frac{7}{5}\right) + 2$

$g(3) = \frac{49}{25} + 2 = \frac{99}{25}$

$f\left(\frac{99}{25}\right) = \frac{99}{\frac{99}{25}} - 4$

$= \frac{99 - 20}{5}$

$= \frac{79}{5}$

Figure 10. S3's completely correct response to Q18 in the posttest

Figure 11. S20's completely correct response to Q19 in the posttest

As seen in Table 7, Q19 was the only question that all of the students answered correctly. As S20's response in Figure 11 shows, the students deciphered the password accurately by easily finding the inverse of the function.

Table 8. *The categories and frequencies regarding the student responses for the questions about function graphs in the pretest*

Pretest Questions	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q20	f(%)
Categories											
Completely correct	2	2	4	1	1	-	2	-	2	-	14(7.00)
Partially correct (a)	-	-	8	-	3	1	1	1	3	3	20(10.00)
Partially correct (b)	-	9	6	2	-	2	1	9	2	4	35(17.50)
Incorrect	12	4	1	10	9	13	9	1	3	3	65(32.50)
Unanswered	6	5	1	7	7	4	7	9	10	10	66(33.00)
Total											200(100)

-: no data in the relevant category.

The categories, frequencies, and percentage distributions of the student responses for the questions about function graphs in the pretest were presented in Table 8. According to the table, 65.50% of the student responses were in the categories of incorrect and unanswered. The students' responses related to the function graphs were given as follows.

S18-Q10: Eight friends g oto the movie "A Beautiful Mind", where the life of a famous mathematician, John Nash, is shown. When they enter the movie theather, the order and seat number of each ticked issued are as in the following chart. Accordingly, for the given table, show the seat of each student on the graph.

Seat	Number
C	1
D	2
E	3
F	4
G	5
H	6
J	7
K	8
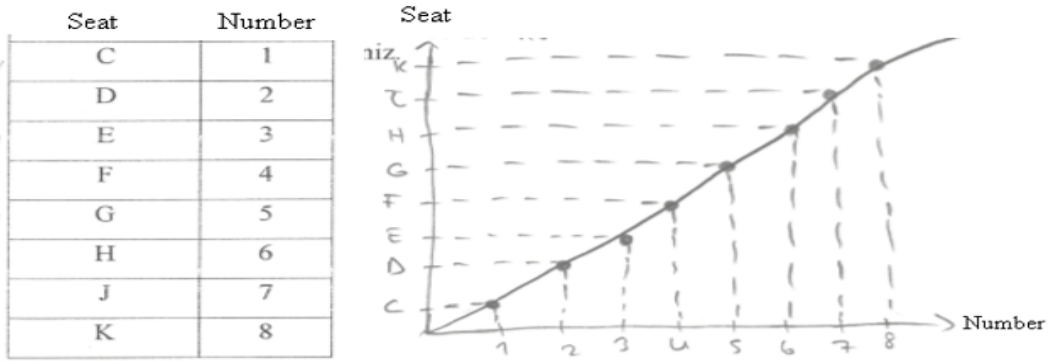
Figure 12. S18's incorrect response to Q10 in the pretest

The 10th question in which the students were asked to draw a graphic of the function for which a table was given was as follows: "8 friends go to the movies to watch 'A Beautiful Mind,' which was about the life of John Nash—a famous mathematician. When they enter the cinema hall, the row and seat number of the ticket issued for each are given in the table. Then, show the seat of each student on a graph for the given table." In Figure 12, S18 connected the dots while drawing a graphic for the 10th question after marking these dots in the graphic, disregarding domains and codomains of the function. However, a function graph can also be in the form of a graph consisting only of ordered pairs (Baki, 2018). The student connected the dots determined in the graph by ignoring the knowledge that not all of the functions have to have an algebraic rule (Uygur-Kabael, 2017). Therefore, S18's response was regarded in the category of incorrect.

S20-Q12: In the graph given, the amount of an apartment's water tank changes according to days. Accordingly, how many days later the water in the tank will be completely finished?

in 20 days   2800

____x____   3600
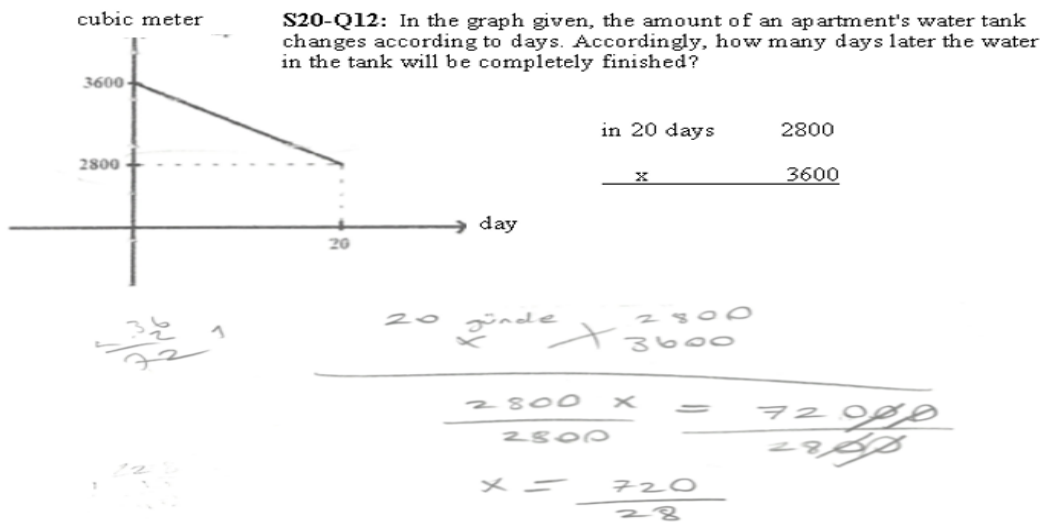
Figure 13. S20's incorrect response to Q12 in the pretest

As seen in Figure 13, S20 tried to find the answer by proportioning instead of solving the 12th question in the pretest by using the definition of the linear function. He should have proportioned as "If 800 cubic meters of water is spent in 20 days, how many days are needed to spend 3600 cubic meters?" However, the student responded to the question incorrectly by proportioning the amount of water in the tank at the end of 20 days instead of finding the difference between the amount of water in the beginning and at the end of 20 days. Therefore, S20's response was regarded as incorrect.
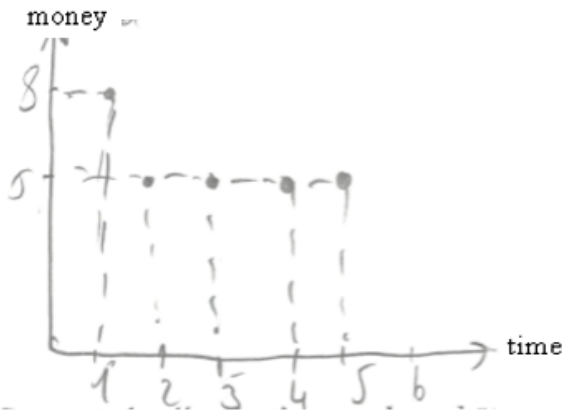
S1-Q13: Parking fee is determined as 8 liras for the first hour in a parking lot. It is necessary to pay 5 liras for every hour after one hour. Accordingly, plot a time-dependent graph of a vehicle remaining in this parking lot for 6 hours.

Figure 14. S1's incorrect response to Q13 in the pretest

It was seen in Figure 14 that S1 ignored the information that the function graph needs to be constant, and the amount needed to be paid for the car park cannot be fixed. Hence, he responded to the question incorrectly. Therefore, S1's response was regarded in the category of incorrect.

S9-Q20: Plot the function f. Also find the inverse of the given function and show it on the graph. Explain how you made a conclusion.
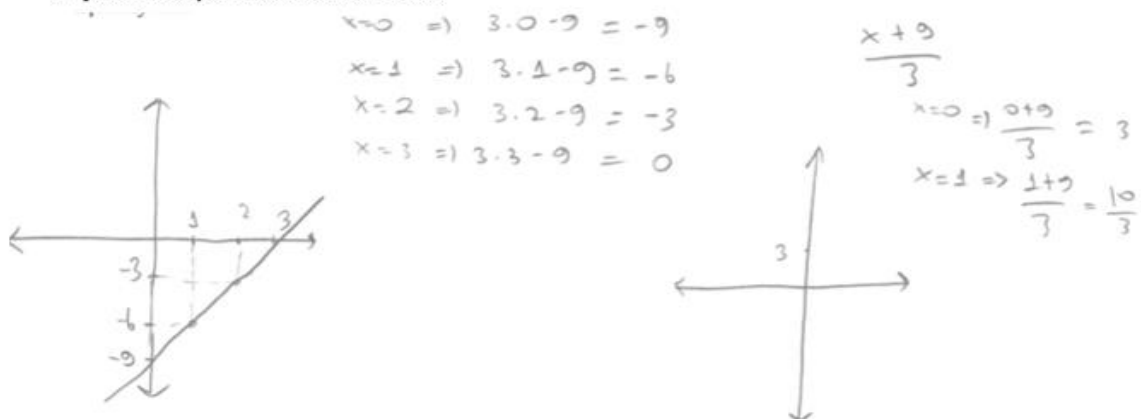
Figure 15. S9's partially correct (a) response to Q20 in the pretest

According to Figure 15, S9 made the graphical representation of the function given as an algebraic expression correctly and found the inverse of the function correctly as well. However, he could not show the inverse of the function on the graph, and he could not conclude that the inverse of a function would be symmetrical to the graph of its function with respect to the line y=x. Therefore, the student's response was regarded in the category of partially correct (a).

Table 9. *The categories and frequencies regarding the student responses for the questions about function graphs in the posttest*

Posttest Questions	Q7	Q8	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q20	f(%)
Categories											
Completely Correct	6	8	12	1	10	1	2	2	5	1	48(25.26)
Partially Correct (a)	9	9	8	6	2	6	5	7	-	11	63(33.15)
Partially Correct (b)	2	1	-	4	4	8	1	4	4	4	32(16.84)
Incorrect	1	-	-	6	2	4	6	6	6	-	19(10.00)
Unanswered	2	2	-	3	2	1	6	5	5	4	28(14.73)
Total											190(99.98)

-: no data in the relevant category

The categories, frequencies, and percentage distributions of the student responses for the questions about function graphs in the posttest were given in Table 9. According to the table, 25.26% of the student responses were in the category of completely correct. The students mostly responded to Q10 and Q12 in the category of completely correct, but they were not able to respond to Q20 in this category. On the other hand, nearly half of the students gave responses in the categories of partially correct (a) and partially correct (b). Some examples of the student responses for the questions about function graphs in the posttest are presented below.

S18-Q10: Eight friends g oto the movie "A Beautiful Mind", where the life of a famous mathematician, John Nash, is shown. When they enter the movie theather, the order and seat number of each ticked issued are as in the following chart. Accordingly, for the given table, show the seat of each student on the graph.
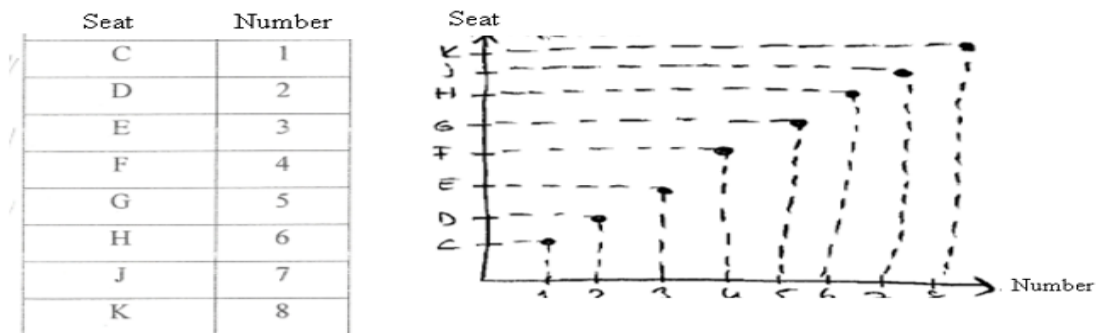

Figure 16. S18's completely correct response to Q10 in the posttest

Figure 16 showed that in the posttest, S18 correctly responded to the question which he responded incorrectly to in the pretest. Within the context of the question, the student's response was regarded in the category of completely correct since dots moved to the graph should not be connected.

S8-Q11: The figure shows a boy's height from 5 to 15 years old. Accordingly, at what age, the height of the child becomes 160 cm.

10 years old 90 cm tall

5 years old 45 cm

1 year old 9 cm

the child was 160 cm in late 12 and early 13

$\begin{cases} 11 \text{ years old } 144 \\ 12 \text{ years old } 153 \\ 13 \text{ years old } 162 \end{cases}$

Between 12-13
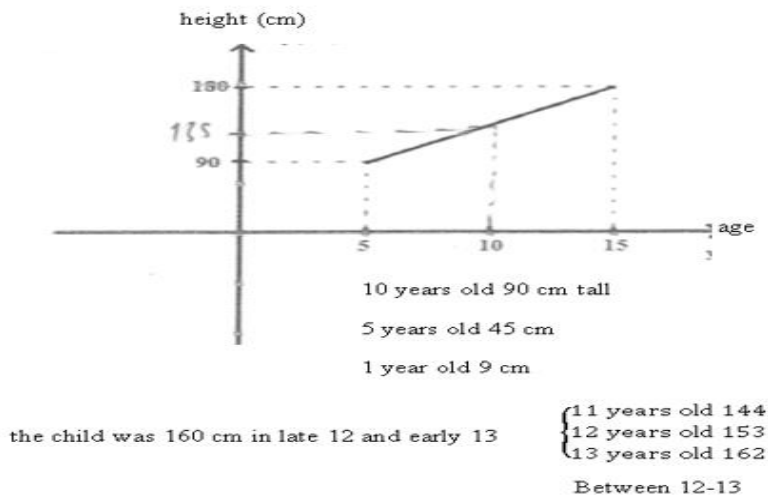
Figure 17. S8's completely correct response to Q11 in the posttest

According to Figure 17, S8, who responded to the 11th question in the category of completely correct in the posttest, demonstrated reasoning ability including proportional reasoning and prediction and deduction (Lesh, Post, & Behr, 1987). With the information that the child is 9 cm longer each year, he reached the correct result by finding out what age the child would be when he reached 160 cm in length.

S20-Q12: In the graph given, the amount of an apartment's water tank changes according to days. Accordingly, how many days later the water in the tank will be completely finished?

800 finished in 20 days

x 3600

x = 90 days later
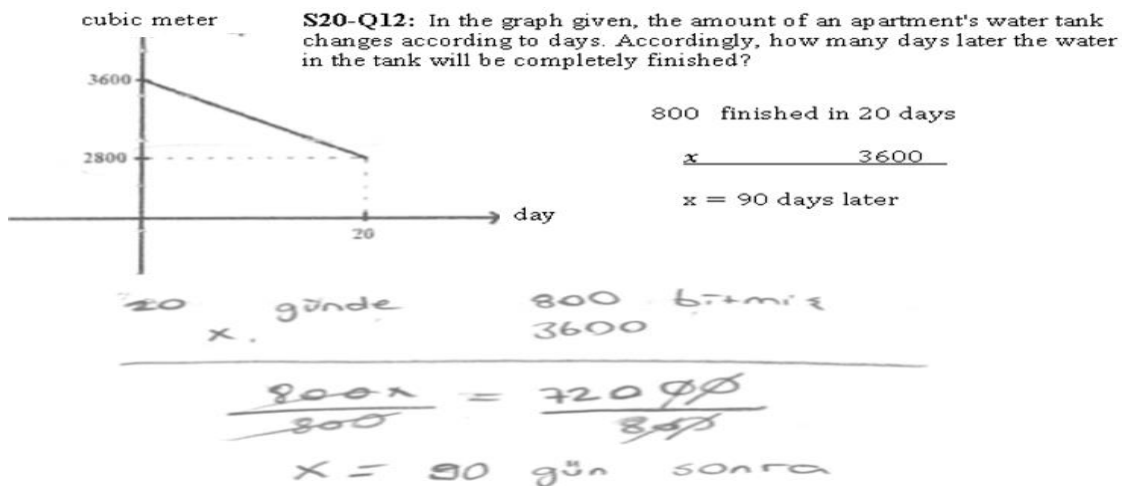
Figure 18. S20' s completely correct response to Q12 in the posttest

As seen in Figure 18, S20 found the correct response by providing proportional reasoning as well as by benefitting from the definition of a linear function. Therefore, S20's response was regarded in the category of completely correct.

S1-Q13: Parking fee is determined as 8 liras for the first hour in a parking lot. It is necessary to pay 5 liras for every hour after one hour. Accordingly, plot a time-dependent graph of a vehicle remaining in this parking lot for 6 hours.
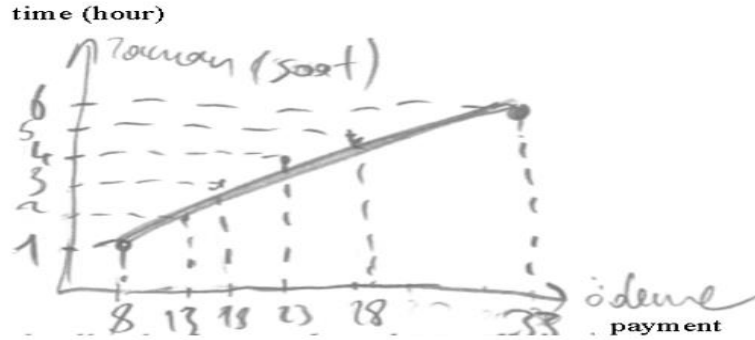
Figure 19. S1's completely correct response to Q13 in the posttest

S1's completely correct response to the 13th question in the posttest can be seen in Figure 19. S1 found the amount needed to be paid 6 hours later accurately by creating a time-paid rate graphic. S1's graphic showing that parking fee increases every hour is correct, so his response was regarded in the category of completely correct.

S9-Q20: Plot the function f. Also find the inverse of the given function and show it on the graph. Explain how you made a conclusion.


The inverse of the function is its symmetry relative to the line x = y.
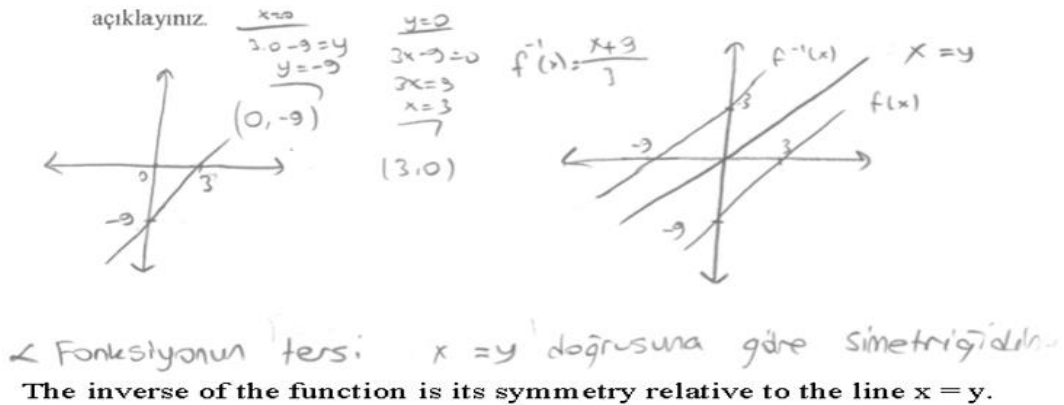
Figure 20. S9's completely correct response to Q20 in the posttest

As seen in Figure 20, S9 found the inverse of the function after drawing the graphic of a function with an algebraic expression. Drawing the graphic of the inverse of the function accurately, the student made the inference that the graph of the inverse of the function was symmetrical with respect to the line y=x. Thus, the student's response was regarded as completely correct.

4.3. Findings Related to the Third Sub-Research Question

In this section, the qualitative findings related to the third sub-research question "What are the views of 10th grade students regarding the method implemented while teaching the topic of functions?" are presented.

Table 10. *The students' views on instruction with scenarios*

Categories	Codes	Subcodes	f	Total(%)
		Its making information more consistent	4	
		Its making lessons more enjoyable	12	
		Its benefits for revealing thoughts	4	30(26.08)
	Views on instruction with scenarios	Its making the topic clear/Its making comprehension easier	4	
		Its contribution to the reinforcement	3	
		Its attracting attention	1	
		Its need for more time	1	
		Its promoting creativity	1	
		Establishing a relationship between mathematics and everyday life/making understanding easier	6	
		Understanding the topic of functions better/making comprehension easier	8	
	Views on learning the topic	Realizing that mathematics is in daily life/using it	6	24(20.86)
		Expressing oneself better/expressing thoughts	1	
		Realizing and eliminating the deficiencies about previous topics	1	
		Its contribution to drawing graphics and creating a function rule	2	
		Enjoyable	3	
	Design of scenarios and activities	Related to everyday life	10	
Positive views		Instructive/Permanent	1	17(14.78)
		Understandable	2	
		Interpretation-promotive	1	
		Out of formulas-plain mathematics	1	
		Its getting easier as time flows	2	
		Easy progress of the lessons	9	
		Instruction's being more understandable with scenarios	4	
		Previous mathematics lessons' being difficult and incomprehensible, yet instruction being more comprehensible with scenarios	5	
	Views on implementation	Its being understood better compared to the previous topics	6	36(31.30)
		Not writing too many things on the notebook	2	
		Lessons' being more enjoyable	4	
		Teaching different topics with scenarios as well	1	
		Teaching with daily life problems	2	
		Inadequacy of operational knowledge	1	
		Encountering such an implementation for the first time	1	6(5.21)
	Views on implementation	Inclusion of verbal texts	1	
		The topics' being associated	1	
		Causing waste of time	1	
Negative views		Not contributing to reveal mathematical ideas	1	
	Views on its contribution for learning the topic	Distraction in lessons	1	2(1.73)
		Inclusion of algebraic expressions	1	
				115(99.96)

Table 10 depicted that 93.02% of the student views on instruction in relation to daily life were positive. Twenty percent and eighty-six percent of consisted of views on teaching with scenarios. The students stated that especially instruction with scenarios made the lessons more enjoyable. "Its making information consistent," "its benefits for revealing thoughts," and "its making comprehension easier" followed this situation. The students expressed that learning the topic of functions via real-life related situations is useful for eliminating deficiencies about previous topics. As shown in Table 10, 14.78% of the students stated that designed scenarios and activities were related to daily life, enjoyable, and clear.

According to Table 10, 31.30% of the student views were that lessons were taught more easily with scenarios and activities; the previous mathematics lessons were difficult, boring and complicated; instruction with scenarios made lessons easier; the topics were understood better; and lessons became more fun and enjoyable. The students also mentioned that they achieved permanent learning. The student views in Table 10 revealed that the students had gotten bored in previous mathematics lessons as they had written too much on their notebooks, but instruction with scenarios made lessons more enjoyable. One of the salient responses in the student interview forms was that instruction with scenarios was different and difficult for students at the beginning.

5. Discussion and Conclusion

5.1. Impact of Instruction with Scenarios on Students' Mathematics Achievement

It was found in the present study that the scenario-based instruction method which was applied to the experimental group of students promoted their mathematics achievement regarding the topic of functions and function graphs. Our study results suggest that the improvement in their mathematics achievement was due to the scenario-based instruction conducted based on daily life problems and on student collaboration and discussion. The topic of functions acts as a bridge between most mathematics topics. Hence, it is an important foundation for the students' improvement in other mathematical processing skills such as reasoning and questioning (NCTM, 2009). As Hiebert and Lefevre (1986) stated in their research, it is possible for students to develop conceptual knowledge with the skill of association. Within this context, the topic of functions was taught with scenarios prepared through real-life association, and the impact of implementation on students' mathematics achievement was investigated. As a result of the study, real-life related teaching resulted in a significant difference between students' pretest and posttest FAT scores regarding the topic of functions. This finding indicates that teaching the topic of functions by supporting it with real-life examples can promote students' achievement in the topic of functions.

5.2. Investigation of the Students' Response Categories to Scenario-Based Teaching

The qualitative data relating to mathematics achievement on the topic of functions from the experimental group was analyzed. The students' answers to the questions about functions and function graphs in the pretest were mostly incorrect, but there were significant improvements in their posttest answers compared to the pretest. When the posttest data were analyzed as a whole, the students performed better than they did prior to implementation.

When the pretest data of the questions related to the definition of function were examined, it was observed that the students generally had deficiencies in determining whether a given graph was a function or not. The students decided whether the given graphs were functions especially by checking how many dots x and y axes intersected. Therefore, it was revealed that more than half of the student responses were in the categories of incorrect and unanswered. The posttest data showed that a large number of students comprehended the definition of function. The students were able to explain the reasons for their responses accurately. However, very few

students had difficulty in deciding whether an algebraic expression was a function or not in the pretest. The students had more difficulties in determining the types of functions and in the algebraic representation of expressions rather than the graphic representation of the definition of the function, but such difficulties decreased significantly following implementation of instruction.

The students had great difficulty in determining the types of functions in the pretest. With no completely correct responses in the pretest, most of the students were unable to make sense of constant functions and unit functions. They used them interchangeably, and they generally used the concepts of composite function or entire function in determining the types of functions. In addition, the students showed the functions with cluster mapping and could not draw the graphs of the given functions in the pretest. Posttest data of the types of functions questions showed that the number of responses in the category of completely correct increased. Although the students were not able to determine the types of functions in these questions, they were able to draw the function graphs.

Regarding pretest operations in functions, combination of functions, and inverse of functions questions, the students attempted to perform operations without determining the definition and value sets of functions in composite functions and to perform the four operations in functions. Moreover, the students responded to the questions about the sum of functions incorrectly by composing. The posttest data showed that the students were able to determine the definition and value sets of functions and to do the four operations in functions, but they had difficulty with the questions about the composite process.

More than half of the student responses to the questions which asked about the drawings of the function graphs in the pretest were categorized as incorrect and unanswered. The students did not appear to know that function graphs can only consist of sequential pairs. They created a line by combining the dots, whereas they should not connect them in the graph. In addition, they thought the function had to be bound by an algebraic rule. Thus, they answered the questions of function graphs incorrectly. The students used proportional information instead of using the definition of linear functions in the pretest questions. They answered the questions incorrectly because they defined the starting point with inaccurate reasoning. The students were able to find the inverse of the functions given by algebraic expression, but could not draw the inverse of the functions given in the graph and could not deduce that the graphs of the function and of its inverse were symmetrical according to the line y = x. The posttest data revealed that the student response categories were higher than those in the pretest data. There was a significant increase in responses categorized as completely correct, and the students achieved the learning outcomes for function graphs.

In a study conducted by Clement (2001), very few students were able to determine the definition of function. In a study by Clement (2001), very few students were able to define functions. In Clement's (2001) study, the students combined the points with a line to create a graph of a group of points (ordered pairs). With this finding, it was revealed that the students saw the graphs of the functions as a line and thought that the functions should always be continuous. It can be said that the results of Clement's (2001) study are in parallel with the results obtained from the pretest data of this study. Because, as revealed in this study (eg, see question 10), Clement (2001) stated in his study that this was due to the fact that the students did not know the formal definition of a function. Another study was done by Karataş and Güven (2003). Karataş and Güven (2003) stated that high school students and prospective teachers could not connect between different representations of functions and failed to determine whether the expressions given were function or not. Similar results were obtained in the pretest data of this study (eg, see questions 1, 2, and 6).

It was observed that the students, who did not have sufficient knowledge for the definition of a function, types of functions, the inverse of functions, operations with functions and function graphs before the implementation, tried to employ mathematical competencies such as association, reasoning, and questioning following the implementation. There is information in the literature that the ability to use graphics is necessary and useful (Argun et al., 2014) in order to realize the relations between concepts and to model the problem situation while solving problems. The findings of the current study confirm this information.

In other words, graphs are a communication used to express information in different ways, and a teaching tool that contributes to the in-depth learning of concepts (Monk, 2003, as cited by Tekin & et al., 2009), as well as convenience and comprehensibility in data organization, summary, interpretation and presentation. (Taşar, İngeç, & Güneş, 2006). In this study in which scenarios are taught, it can be considered in problem situations arising from the handling of real life problems that students create the rule of function, show the types of functions with graphics, determine whether there is a function by plotting a given algebraic expression, and determine whether a given graph is a function.

In this research, when the pretest and posttest data were analyzed as a whole, the student responses progressed from the categories of incorrect and unanswered in the pretest to the categories of completely correct and partially correct in the posttest. This data suggests that instruction with scenarios related to daily life can promote students' mathematics achievement in the topic of functions.

5.3. Impact of Instruction with Scenarios on the Students' Views

Views on the method employed for teaching the topic of functions and function graphs were also collected from the students participating in this study. The findings obtained by content analysis of the students' views supported the findings regarding the quantitative data analysis. The analysis results revealed that there was a significant difference between the pretest and posttest FAT scores, and the difference was in favor of the posttest scores. Thus, the students mostly expressed positive views about the implementation. For instance, the number of students stating that instruction with scenarios was enjoyable, that it made understanding the topic easier, that it was useful for revealing thoughts, that it helped especially the topic of functions to be understood better, and that it made realizing and using mathematics in real life situations easier was quite high. In contrast, the students expressing negative views stated that they had difficulty early in the implementation since this was their first encounter with such an application. The results of the current study and the results of the study carried out by Çağırgan-Gülten et al. (2009) are compatible. Çağırgan-Gülten et al. (2009) stated that high school students do not have enough knowledge about the use of mathematics topics in daily life and the majority of them are not given daily life-related examples in their lessons. They also expressed that if daily life related situations are given in lessons, the students can learn easily and better.

5.4. Implications

The topic of functions has its own difficulties and inclusion of different representations is one of the reasons that students experience difficulties with this topic. Since function and function graphs are concepts that have real-world application areas, like most mathematical concepts, it is suggested that students be given examples that they can associate with daily life, that teaching be supported with real-life related scenarios, and that problems that require the use of the concept of function are appropriate for the structure of the topic.

By preparing scenarios suitable for other topics of mathematics and by using this teaching method at every grade level in secondary school, the effects on students' achievement levels in

mathematics courses can be examined and comparisons can be made in various categories.

In this field, it was deemed appropriate to carry out the current research within the frame of developing the importance of analyzing functional thinking, that is, the relationship between changing quantities with mathematical words, symbols, tables, or graphic representations (Blaton et al., 2011. as cited by Uygur-Kabael, 2017). Finally, the small sample size of the research can be perceived as a limitation. However, the fact that the qualitative aspect of the research is predominant and the thought that it cannot be generalized to a larger sample group may decrease this limitation to a certain extent. Similar studies carried out in the future with more sample groups will give more enlightening results when the impact of teaching the topic of functions by associating with real life on students' mathematics achievement is investigated. This research can be repeated by using a quasi-experimental pattern with pretest-posttest control groups. With the acquisition of qualitative data the results can be presented in detail.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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PHYSICAL EDUCATION AND SPORTS: BIBLIOMETRIC ANALYSIS OF THE ERIC DATABASE

Research article

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PHYSICAL EDUCATION AND SPORTS: BIBLIOMETRIC ANALYSIS OF THE ERIC DATABASE

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Abstract

In respect to the growing interest in physical education and sports, the state of this large number of scientific literature and the bibliometric analysis has not been conducted. The purpose of this study to investigate the literature involved physical education and sports topics regarding the descriptive bibliometric analysis. We gathered the open-access data from ERIC within the permission of this database for non-commercial data usages. After a systematic query whole, ERIC database scrapped between the 2010-2019 year and retrieved a total of 365861 journal articles considered of 25573 articles as physical education and sports-related. There were 7581 articles published at the top 25journals (% 29.64). Subjects analysis according to "Physical education" was the commonly associated topic in this field. The findings of this study observed that the ERIC database covered a huge number of articles regarding PE and sports topics. Dynamics of the research literature suggest the US was the first contributor country to both authors and articles. Hence, we conducted a descriptive analysis of the literature indexed in the ERIC database theme include physical education and sports. This study provided a bibliometric analysis of an enormous number of articles after filtering the biggest education basis database.

Keywords: bibliometric analysis, physical education, sports, ERIC database

1. Introduction

The Education Resources Information Center (ERIC) is an online digital library for educational studies and information sponsored by a public institute (Institute of Education Sciences of the United States Department of Education) since 1966. The coverage of the ERIC database provides variety's types of publications such as journal articles, books, conference papers, thesis, reports, etc. This extensive education database includes over 1000 journals, 1.6 million items and 350,000 accessible full-text materials (Rudner, 1999). However, this tremendous amount of materials considered as "grey literature" because of a portion of reports and conference papers. Therefore, it is important to bibliometric analysis of this growing literature to understanding trend topics in the related area and impacts to both journals and researchers ("National Center for Education Evaluation and Regional Assistance (NCEE)

Home Page, a part of the U.S. Department of Education.," 2020). The ERIC index is essential for education researchers related to physical education (PE) and sports cause of vulnerable contribution to the area with underlining the importance of physical activity and revelation of the standards for PE (Young, 1997). Bibliometric analysis affords priority and tendency of the researchers, which is useful information to the indicator of the subject impacts of published articles in these journals. Moreover, the in-depth analysis is also useful to determine if it may achieve the major topics or trends in the area to develop and implementation of education goals regarding PE and sports (Shilbury, 2011). Previous studies conducted to the analysis of the literature for the sport management by the searching Web of Science (Belfiore, Iovino, & Tafuri, 2019; Shilbury, 2011). The study investigated by Khoo et al., applied a variation of the methodology, which focused on citations of the publications for bibliometric analysis in disability sport (Khoo, Li, Ansari, & skills, 2018). In another research paper, Zavrśnik et al., analyzed the literature based on sports education to identify the most productive research topics regarding a special sports education model that used in curriculums of the elementary and high school (E. Zavrsnik, Kokol, Pisot, Blazun, & Sport, 2015). However, this study performed the searching keywords in the Scopus database (Scopus, Elsevier) is a commercial database service. Further, there is a wide application of the bibliometric analysis in special references to different sports disciplines such as judo, badminton, and soccer (Blanca-Torres, Ortega, Nikolaidis, & Torres-Luque, 2020; Brito, Nassis, Seabra, Figueiredo, & medicine, 2018; Peset Mancebo et al., 2013). Nevertheless, to date, there is a not linked or unified gap of analyzed literature throughout the widely published scientific articles in the area of physical education and sports regarding ERIC database which is one of most inclusionary educational databases. The aim of this study is to identify of the literature involved physical education and sports topics regarding the descriptive bibliometric analysis.

2. Method

We gathered the open-access data from ERIC within the permission of this database for non-commercial data usages. We applied a custom-made query because of the ERIC database covered other educational studies. ERIC indexed materials in ERIC gains title, authors, subjects, publishers, sponsors (if exists), type (journal articles, books, dissertations, reports, conference papers, etc.), sources (journal name, publishers), and year information.

We excluded the other resources and searched for only articles. After a systematic query whole ERIC database scrapped between2010-2019 year and collected a total of 365861 journal articles. Twentynine mandatory and 71 sports science-related subjects determined and keywords from the area created (Table 1). Including criteria of articles based on our query rules "Selected sports science-related topics AND Related keywords in abstracts) OR Selected mandatory topics" as shown in Figure 1.

Table 1 *The subjects and keywords used throughout the selection of articles*

Mandatory subjects	Related subjects	Keywords	
Physical Education	Skill Development	Athlete	Drop jump
Training	Performance Factors	Athletes	Body fat
Physical Activities	Health Promotion	Athletic	Muscle
Coaching (Performance)	Evaluation	Swimming	Skeletal muscle
Athletics	Measurement	Athletics	Slow twitch
Physical Activity Level	Measurement Techniques	Coach *	Glycogen
Team Sports	Health Education	Coaching *	Creatine kinase
Athletes	Child Health	Detraining	ATP
Intramural Athletics	Teaching Skills	Exercise *	Tennis
Physical Health	Performance	Exercise physiology	Creatine phosphate
Physical Fitness	Public Health	Fitness	Agility
College Athletics	Physiology	Health-related	Wrestling
Athletic Coaches	Health	Camps	Biomechanics
Exercise Physiology	Exercise	Physical activity	Biochemistry
Health Related Fitness	Skill Analysis	Physical education	Injury
Aquatic Sports	Measurement Equipment	Recreation	Heart rate
Team Training	Medicine	Sport	Cardiac output
Sports	Decision Making Skills	Sports	Running
Sport Psychology	Performance Technology	Team sports	Distance covered
Racquet Sports	Physical Therapy	Training *	Badminton
Sports Medicine	Fatigue (Biology)	Soccer	Pretest *
Sportsmanship	Medical Evaluation	Handball	Pre-test *
Women's Athletics	Cognitive Measurement	Basketball	Wearable
Student Athletes	Health Sciences	Volleyball	IMU
Extramural Athletics	Physical Characteristics	Olympic	Acceleration
Adapted Physical Education	Therapeutic Recreation	Countermovement jump	
Physical Recreation Programs	Student Eval. of Teacher Perf.		Football
Physical Education Facilities	Student Teacher Evaluation	Athletic performance	Netball
Physical Education Teachers	Physical Mobility	Aerobic	Adenosine triphosphate
	Test Coaching	Anaerobic	Change of direction
	Volunteer Training	Kinesiology	
	Retraining	Anthropometric	
	Health Activities	VO2max	
	Vocational Training Centers	Lactate	
	Preventive Medicine	Endurance	
	Teacher Skills	Strength *	
	Recreational Activities	Power *	
	Recreation	Resistance Training	
	Physical Development	Plates	
	School Recreational Programs	Throwing	
	Ppysical Performance	Gymnastic	

 * Although being essential keywords, we excluded those because of confused with other educational technical terms and retrieved unrelated materials.
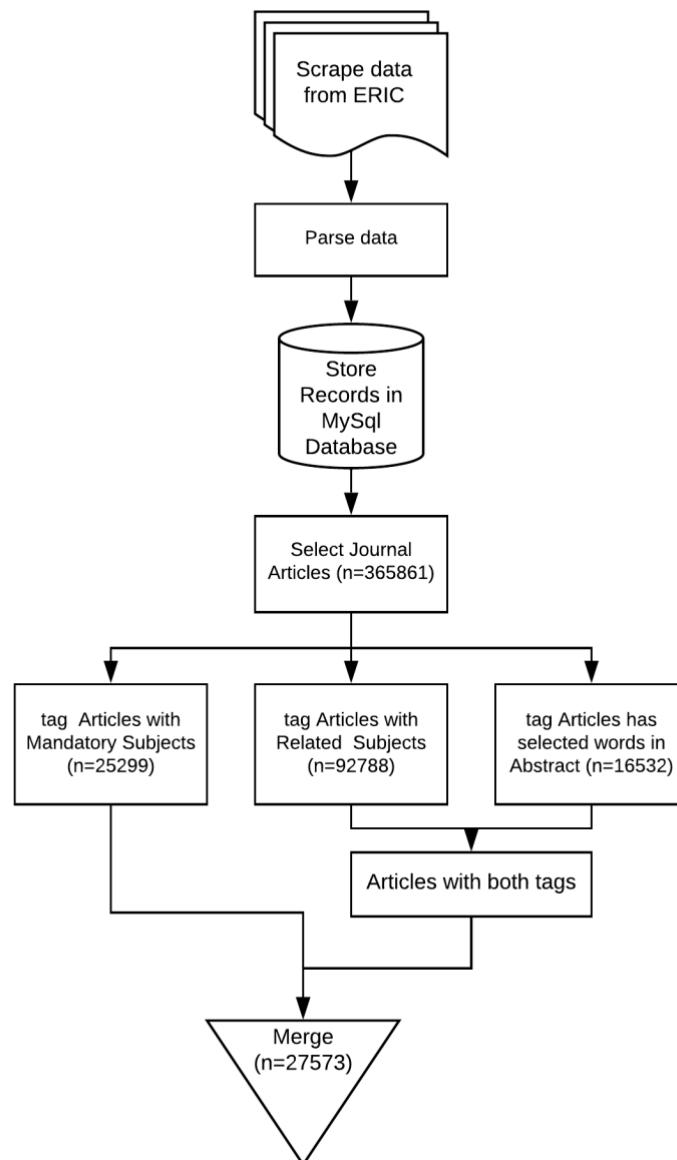
Figure 1 The searching algorithm of the ERIC database.

We performed a distribution of articles for each year along 10-year. The most article published journals generated and top 25 journals considered as most preferred sources. During the publishing, the article most set out topics found, and top 25 subjects listed. We performed a distribution of subjects for each year along 10-year. Top 25 country listed from geographic data processed articles from our database (n=16398). Number of owned articles of authors listed top 25 authors included for most influential authors. Country and institutional information provided from web-based searching for each author. In this study we visualized by creating the word cloud for subjects and titles of included articles. Word cloud sorts of the words the selected text according to most frequently used words and displays that words bigger and closer to the center of cloud. During the word cloud process for the title we exclude the propositions, conjunctions, pronouns, numbers, definite articles.

3. Results

In this study, we retrieved total 365861 journal articles for 10 years period and considered of 25573 articles as physical education and sports related. The number of articles published each year was similar whereas the fewest articles in 2013 and the highest one in 2017.

When we examine the source of the articles, there were 1542 different journals. There were 7581 articles published at the top 25 journals (% 29.64). In this ranking Research Quarterly for Exercise and Sport was the first journal with 644 articles (Table2).

Table 2 *Geographical and source analysis of articles: The countries and journals top 25.*

Country	Number of articles	Journals as source	Number of articles
United States	5031	Research Quarterly for Exercise and Sport	644
United Kingdom	1582	Sport, Education and Society	528
Australia	1199	Journal of Leadership Education	447
Turkey	1130	Strategies: A Journal for Physical and Sport Educators	446
Canada	863	Journal of Physical Education, Recreation & Dance	443
China	336	European Physical Education Review	408
Spain	290	Physical Educator	380
New Zealand	288	Physical Education and Sport Pedagogy	362
Germany	271	Journal of School Health	336
Sweden	256	Journal of Teaching in Physical Education	324
Netherlands	230	Journal of Education and Training Studies	319
South Africa	217	Athletic Training Education Journal	308
Ireland	190	Health Education & Behavior	247
Finland	173	Quest	245
Norway	172	Journal of Social Work Education	230
Taiwan	149	Measurement in Physical Education and Exercise Science	226
Hong Kong	147	Journal of Extension	226
Greece	142	Health Education Journal	212
France	141	Health Education Research	210
Georgia	138	Universal Journal of Educational Research	190
Russia	134	Educational Research and Reviews	185
Brazil	126	Counselor Education and Supervision	175
Iran	126	Online Submission	173
India	117	Research in Developmental Disabilities: A Multidisciplinary Journal	160
Korea	115	Journal of Physical Education, Recreation & Dance (JOPERD)	157

The most common geographical contribution on the topic observed from United States. Following countries were the United Kingdom and Australia and Turkey which took part with more than one thousand articles. The top 25 countries associated a total of 13563 articles which covered more than % 53 of generally published articles (Table 2).

Subjects analysis according to years indicated that "Physical education" was the commonly associated topic in this field. Physical education assigned as the first subject in six of ten years whereas found place in the top three in these exceptional years (Table 3).

Table 3 *Subjects distribution of the published articles according to the years.*

2010 (2452 articles)		2011 (2867 articles)		2012 (2892 articles)		2013 (1515 articles)		2014 (3016 articles)	
Subjects	*No*	*Subjects*	*No*	*Subjects*	*No*	*Subjects*	*No*	*Subjects*	*No*
Evaluation Methods	425	Physical Education	513	Physical Education	418	Physical Activities	227	Physical Education	529
Physical Activities	340	Physical Activities	446	Physical Activities	382	Physical Education	176	Physical Activities	369
Physical Education	315	Evaluation Methods	384	Evaluation Methods	283	Counselor Training	162	Skill Development	342
Evaluation	264	Training	273	Training	280	Training	161	Training	291
Skill Development	222	Skill Development	247	Leadership Training	271	Transfer of Training	135	Program Evaluation	254
Counselor Training	211	Mental Health	235	Skill Development	271	Skill Development	121	Physical Education Teachers	245
Mental Health	204	Athletics	233	Performance Factors	242	Mental Health	99	Physical Activity Level	243
Training	196	Health Promotion	205	Counselor Training	234	Program Evaluation	98	Transfer of Training	224
Health Promotion	186	Performance Factors	198	Training Methods	222	Coaching (Performance)	93	Leadership Training	223
Program Evaluation	186	Evaluation	197	Mental Health	209	Health Promotion	92	Health Promotion	218
Student Evaluation	177	Counselor Training	196	Program Evaluation	199	Evaluation Methods	89	Coaching (Performance)	216
Physical Activity Level	164	Physical Activity Level	195	Athletics	195	Physical Education Teachers	84	Student Evaluation	215
Leadership Training	161	Leadership Training	191	Transfer of Training	176	Athletics	83	Athletics	213
Physical Health	155	Physical Education Teachers	189	Physical Education Teachers	175	Leadership Training	83	Evaluation Methods	207
Health Behavior	141	Program Evaluation	186	Physical Activity Level	171	Physical Activity Level	81	Health Behavior	207
Athletics	140	Transfer of Training	168	Health Education	149	Performance Factors	79	Counselor Training	195
Transfer of Training	140	Training Methods	165	Health Promotion	149	Evaluation	76	Health Education	171

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Subjects	No	Subjects	No	Subjects	No	Subjects	No	Subjects	No
Performance Factors	132	Physical Health	148	Student Evaluation	147	Training Methods	74	Mental Health	151
Physical Education Teachers	131	Health Behavior	144	Coaching (Performance)	146	Health Behavior	72	Team Sports	140
Health Education	129	Health Education	142	Physical Health	143	Measurement	71	Performance Factors	135
Training Methods	116	Student Evaluation	139	Measurement	140	Student Evaluation	70	Training Methods	132
Child Health	115	Health Services	131	Evaluation	136	Team Sports	70	Physical Fitness	115
Team Sports	114	Team Sports	112	Athletes	125	Physical Health	67	Athletes	114
Athletes	110	Physical Fitness	110	Health Behavior	111	Athletes	66	Child Health	114
Measurement Techniques	103	Measurement	109	Team Sports	109	Physical Fitness	58	Exercise	106
2015 **(2832 articles)**		**2016** **(2912 articles)**		**2017** **(3128 articles)**		**2018** **(2951 articles)**		**2019** **(3008 articles)**	
Subjects	No	Subjects	No	Subjects	No	Subjects	No	Subjects	No
Skill Development	467	Physical Education	452	Leadership Training	568	Physical Education	508	Physical Education	464
Physical Education	405	Skill Development	421	Skill Development	454	Physical Activities	364	Skill Development	434
Training	341	Training	352	Physical Education	405	Skill Development	361	Training	378
Physical Activities	294	Physical Activities	315	Training	372	Training	334	Physical Activities	347
Program Evaluation	264	Athletics	260	Physical Activities	289	Athletics	331	Athletics	330
Transfer of Training	246	Transfer of Training	232	Athletics	242	Team Sports	256	Leadership Training	271
Leadership Training	243	Leadership Training	224	Evaluation Methods	227	Physical Education Teachers	242	Transfer of Training	250
Coaching (Performance)	242	Program Evaluation	211	Coaching (Performance)	224	Athletes	237	Physical Education Teachers	234
Athletes	226	Coaching (Performance)	200	Transfer of Training	224	Leadership Training	236	Coaching (Performance)	225
Evaluation Methods	210	Health Promotion	194	Physical Education Teachers	219	Physical Activity Level	206	Physical Activity Level	220
Health Promotion	210	Physical Activity Level	191	Training Methods	207	Coaching (Performance)	196	Team Sports	214
Physical Activity Level	204	Evaluation Methods	180	Program Evaluation	203	Transfer of Training	195	Mental Health	197

Subject	Value	Subject	Value	Subject	Value	Subject	Value	Subject	Value
Student Evaluation	200	Physical Education Teachers	178	Physical Activity Level	178	Counselor Training	167	Counselor Training	187
Training Methods	200	Counselor Training	172	Student Evaluation	173	Evaluation Methods	153	Athletes	177
Physical Education Teachers	179	Student Evaluation	171	Counselor Training	145	Health Promotion	149	Health Promotion	175
Counselor Training	169	Training Methods	166	Mental Health	136	Program Evaluation	148	Health Behavior	167
Health Behavior	150	Mental Health	152	Athletes	130	Exercise	144	Student Evaluation	159
Health Education	131	Athletes	151	Team Sports	126	Student Evaluation	141	Evaluation Methods	142
Performance Factors	125	Health Behavior	139	Health Promotion	125	Health Behavior	139	Program Evaluation	131
Self Evaluation (Individuals)	115	Team Sports	135	Health Behavior	117	Mental Health	136	Exercise	125
Teaching Skills	104	Health Education	126	Teaching Skills	117	Health Education	114	Physical Fitness	108
Mental Health	100	Exercise	113	Health Education	111	Training Methods	108	Performance	104
Athletes	97	Self Evaluation (Individuals)	98	Formative Evaluation	104	Physical Fitness	103	Athletic Coaches	93
Exercise	94	Physical Fitness	97	Performance Factors	93	Measurement	96	Health Education	91
Measurement Techniques	94	Formative Evaluation	93	Self Evaluation (Individuals)	93	Performance	96	Physiology	87

The prominent subjects of all 10 years period were "Teaching methods and Student attitudes" (Figure 2).

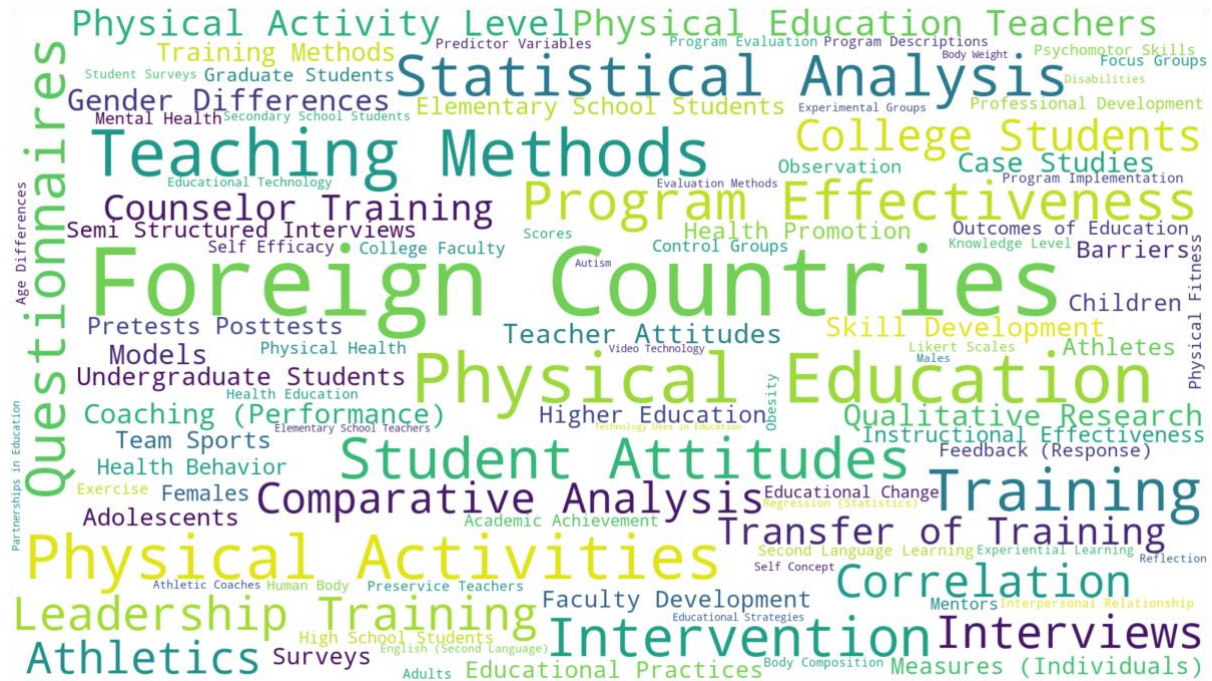*Figure 2* Word cloud of subjects of the all articles retrieved for 10-year.

Numbers of contributed authors on the sports science's topic found that 58083. As illustrated at the table 4, first 25 ranked authors published a total of 813 articles and most productive author has 67 articles. Investigation of the institutional analysis of the authors showed the domination of universities from the United States (18/25).

Table 4. *The most influential authors, number of articles and affiliations.*

Author	Articles no	Institution	Department	Country
Richards, K. Andrew R.	67	University of Illinois at Urbana-Champaign	Kinesiology and Community Health	United States
Mazerolle, Stephanie M.	53	University of Connecticut	Department of Kinesiology	United States
MacPhail, Ann	46	University of Limerick	Department of Physical Education and Sport Sciences	Ireland
Haegele, Justin A.	39	Old Dominion University	Department of Human Movement Sciences	United States
Penney, Dawn	37	Edith Cowan University.	School of Education	Australia
Kirk, David	35	University of Strathclyde	School of Education	Scotland
Ward, Phillip	34	The Ohio State University	Department of Human Sciences	United States
Bowman, Thomas G.	31	University of Lynchburg	*Athletic Training*	United States
Kulinna, Pamela Hodges	31	Arizona State University,	Mary Lou Fulton Teachers College	United States
Hastie, Peter A.	30	Auburn University	School of Kinesiology	United States
Quennerstedt, Mikael	30	Örebro University	School of Health Sciences	Sweden
Zhu, Xihe	30	Old Dominion University	Department of Human Movement Sciences	United States
Harvey, Stephen	30	Ohio University	Recreation and Sports Pedagogy	United States
Cardinal, Bradley J.	29	Oregon State University	College of Public Health and Human Sciences	United States
Macdonald, Doune	29	University of Queensland	School of Human Movement Studies	Australia
Casey, Ashley	29	Loughborough University	School of Sport, Exercise and Health Sciences	United Kingdom
Li, Weidong	28	The Ohio State University	Department of Human Sciences	United States
Pill, Shane	28	Flinders University	College of Education	Australia
Sato, Takahiro	27	Kent State University	School of Teaching	United States
van der Mars, Hans	27	Arizona State University,	Mary Lou Fulton Teachers College	United States
Webster, Collin A.	27	University of South Carolina	College of Education,Physical Education	United States
McCaughtry, Nate	24	Wayne State University	Kinesiology, Health and Sport Studies	United States
Xiang, Ping	24	Texas A&M University	College of Education and Human Development	United States
Beighle, Aaron	24	University of Kentucky	College of Education	United States
Judge, Lawrence W.	24	Ball State University	School of Kinesiology	United States

We performed further analysis to understand real attitude of the articles, words counted in the titles of the publications. As shown in the word cloud (Figure 3) most frequently words used in the titles were "Physical education; Physical activity; Training; Learning; Development; Student and Teacher".

Figure 3 Visualization of most frequently take part words in the title.

4. Discussion

The current study was carried out to highlight the current knowledge on a solidify topic (PE and sports) within its tendency that useful to guide the researchers for future studies. One of the importance of this study considering that no bibliometric research in sports science for the ERIC database. The findings of this study observed that the ERIC database covered a huge number of articles regarding PE and sports topics. Dynamics of the research literature suggest the US was the first contributor country to both authors and articles. In addition, physical education and physical activity and educational basis topics more attractive subjects compared to athletic performance.

Research subject distribution and title word analysis results showed that major topics in the ERIC database was physical education, physical activities, physical activity level, learning, teaching, and coaching in the last 10 years. This may be partly explained by the educational basis index covers more publications in relation with program developing, teaching or students attitudes and behaviors in physical education. Similarly, there was a high network density of title and abstract in terms of education thematic analysis in sport entrepreneurship (González-Serrano, Jones, & Llanos-Contrera, 2019). Current journal analysis also supported the educational priority in the ERIC publications. We observed that journals namely "*Sport, Education and Society; Strategies: A Journal for Physical and Sport Educators; Journal of Physical Education, Recreation & Dance; European Physical Education Review; Physical Educator; Physical Education and Sport Pedagogy; Journal of Teaching in Physical Education, and Journal of Education and Training Studies*" have placed in top 25. However, we did not consider the languages except English. Moreover, the current study did not take into account the other publication types except original articles. One of the methodological differences of this study was an article commonly assigned over one subject by the ERIC database.

Current study considered the last decade of PE and sports-related publications, authors, journals, and subjects in the ERIC database. Interestingly, the first ranking country that

contributed to the PE and sports area was the United States. Moreover, the most productive authors' in this study were also US residential institutions. An explanation for this result was education and sports are restricted related in the US, with common high schools and colleges have organized sports team determined by the cultural contexts (Pot & van Hilvoorde, 2013). College football and basketball tournaments are very famous organizations in the US that performed under the National Collegiate Athletic Association (NCAA). Therefore, it is not a surprise to these teams, athletes, and students demanding more scientific knowledge and more employment of the sports scientists produce more articles. Another possible explanation to this result was countries that giving more importance to the athletic programs and Olympic, also more active in the academic publishing in the PE and sports area. In a supporting study, researchers analyzed on technological usage in PE focused on Web of Science publications and found that articles merge in last 5-year. In agreement with our results, the United States was an efficient contributor country in the technology area, whereas Spain was the most influential one on virtual or augmented reality studies (Calabuig-Moreno, González-Serrano, Fombona, & García-Tascón, 2020). Further, in the bibliometric study of combat sports US dominance on scientific contribution revealed similar with current findings (Gutiérrez García, Pérez Gutiérrez, & Calderón Tuero, 2011). In the study that sport, education and society based bibliometric analysis querying from the Scopus database Zavŕsnik et al., showed that US occupied the first rank for most productive country (J. Zavrsnik et al., 2016).

The previous studies focused on bibliometric analysis for the sports science area regarding the country, continent, or society. In the study researched the development of Chinese sports sciences literature, Zhang emphasized the importance of academic thesis and increased multidisciplinary collaboration. However, they found that social and psychology subjects covered most of the literature instead of a lower percentage of physical education (Zhang & Education, 2017). This result may be explained by searching only Chinese databases. Similarly, Andrade et al., investigated another geographical based bibliometric analysis on South American sports sciences literature (Andrade, López, Ramírez-Campillo, Beltrán, & Rodríguez, 2013). Contradictory to our results, they found that most of the scientific papers from this continent were sports medicine related topics such as physiology, orthopedic and rehabilitation (Andrade et al., 2013). However, their searching algorithm included Web of Science and excluded other databases. In another study, Fares et al., took attention to sport and exercise medicine regarding the last 15 years for Arab society. They demonstrated that growing literature and scientific productivity is related to sport and exercise medicine (Fares, Fares, Baydoun, Fares, & medicine, 2017). We could not compare with current findings because they did not analyze the topics. Most published number of articles from Qatar and Tunisia first ranked country respect to the articles per average gross domestic product. These countries have no association with ERIC database materials where current analysis got five articles for Qatar and six for Tunisia.

5. Limitations and conclusion

Current findings limited to 10-year period and ERIC database for PE and sports-related topics and keywords. Further research needed to analyze the author's network and citation interactions to understand what quantities required for being addressed in an effective publication. Last decade researches consolidate to citation analysis in this kind of bibliometric study (Müller, 2015). Hence, we conducted a descriptive analysis of the literature indexed in the ERIC database between the 2010-2019 theme include physical education and sports. This study provided a bibliometric analysis of an enormous number of articles after filtering the biggest education basis database.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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INTEGRATION OF MEDIA AND CRITICAL LITERACY INTO CURRICULUM THROUGH THINKING EDUCATION: FROM TEACHER TRAINING PERSPECTIVE

Research article

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INTEGRATION OF MEDIA AND CRITICAL LITERACY INTO CURRICULUM THROUGH THINKING EDUCATION: FROM TEACHER TRAINING PERSPECTIVE

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Abstract

This research has pointed out the effects of thinking education on the prospective teachers' critical and media literacies. The research, designed as mixed method with sequential triangulation, has enlightened the efficacy of thinking education on the prospective teachers' literacies. The study group, selected by the sampling criteria, one of the purposive sampling methods, composed of 40 social studies prospective teachers, having been trained in terms of thinking critically on media messages and texts, at Education Faculty, Bartin University during the 2016-2017 academic year. It is concluded that post-test media literacy and critical literacy scores of the trained prospective teachers have increased. Moreover, the positive effects of thinking education on the prospective teachers' media and critical literacies are expressed in detail within the framework of various qualitative data and it is inferred that thinking education reached the goal of training critical literate and media literate individuals. Furthermore, how to integrate media literacy and critical literacy into any curriculum in teacher education has been exemplified through this research. Therefore, these literacies should be taught independently from any subject or a discipline as the objectives of teacher education curriculum.

Keywords: thinking education, critical literacy, media literacy

1. Theoretical Information on Thinking Education, Media and Critical Literacies

Thinking is a cognitive activity, everyone has experienced in every part of life as a student, as a citizen, as a friend, as an adult without realizing how to think. Paul and Elder (2002) emphasized that much thoughts are biased, distorted, partial or uninformed and excellence in thought must be provided in a systematic way. Systematically cultivation of accurate, consistent and logical thoughts with lack of bias, is possible through thinking education focusing on such questions as what does thinking mean?, how does the brain process information?, how are thoughts analyzed, evaluated and reconstructed?, how are thoughts analyzed in terms of standards such as clarity, accuracy, precision, relevance, depth, logic, breadth, significance, fairness? What are the elements of thought? How are the thoughts analyzed in terms of such elements as point of view, purpose, information, interpretation and inference, concepts, assumptions, implications and consequences? That is to say, separating the elements of thinking and scrutinizing the use of each part as well as evaluating thoughts in terms of such standards as clarity, accuracy, etc. can be experienced in thinking education. Because the analysis and assessment of thinking belong to a clear understanding of the parts of thinking and applying the standards for thinking to those parts (Paul and Elder, 2002). Paul and Elder (2002) emphasized that a clear understanding of the parts of thinking, applying the standards for thinking to those parts, above all thinking with regard to these factors on a daily basis will improve the quality of human life significantly.

According to Paul and Elder (2002), beginning to learn how to think critically is like the first step in learning how to play tennis, basketball, etc. in such a way that the first step is to learn the most fundamental elements for both of them. Assessment of any thought relates to analyzes of the parts of thinking. The parts of thinking are summarized in just two sentences: "Whenever you are thinking, you are trying to accomplish some purpose, within a point of view, using concepts or ideas. You are focused on some issue or question, issue, or problem, using information to come to conclusions, based on assumptions, all of which have implications." (Paul and Elder, 2002).

From Paul and Elder's points of view, how to analyze someone's thinking with regard to elements of thought can be explained in such a way: Capturing the purpose or goal of someone's thinking, namely searching for the answer to this question "What is the fundamental purpose of someone's thinking?" is the first step. It is followed by capturing someone's point of view as a critical thinker, familiar with the fact that thinking has some comprehensive focus or orientation, and trying to answer the question "what is someone's point of view with respect to the issue? Then, "what is the key question in someone's thinking?" and "what is the most basic concept in someone's thinking?" are the questions tried to be answered in the process of analysis of thinking. Realizing concepts in thinking means generally thinking within the framework of categories or ideas obtained as a result of analysis of information in someone's thinking. The answer to the question such as "What information is needed to answer the question in someone's thinking?" makes it clear that someone's thinking is based on some set of facts or information. That is to say, the factual basis for thinking become significant. Not only are conclusions and inferences taken into account in the process of thinking but also implications are the other elements to be considered. Fisher (2001) also emphasizes what someone has done upon thinking critically. These are identifying the elements in a reasoned case, especially reasons and conclusions; evaluating assumptions; clarifying and interpreting expressions and ideas; questioning the acceptability, especially the credibility of claims; evaluating arguments of different kinds; analyzing and producing explanations; making decisions, drawing inferences and generating arguments. Fisher's explanation on any critical thinker's behaviors indicates that the parts of thought, stated by Elder and Paul (2002) is analyzed upon thinking critically.

Interrelation among the elements of thought are emphasized by Paul and Elder (2002) making analogy between the elements of thought and the essential parts of the human body. Their way to explain these interrelationships is that: "Our purpose affects the manner in which we ask questions; The manner in which we ask questions affects the information we gather; The information we gather affects the way we interpret it; The way we interpret information affects the way we conceptualize it; The way we conceptualize information affects the assumptions we make; The assumptions we make affect the implications that follow from our thinking; The implications that follow from our thinking affect the way we see things, our point of view". That is to say, consideration on the elements of thinking makes someone be aware of thinking process and think critically on someone's own thoughts and others' thoughts. In this case thinking critically means assessing one's own thinking or others' thinking. In addition to analysis of the parts of thinking, assessment of one's thinking also includes applying such logic standards as clarity, accuracy, precision, relevance, depth, breadth, logicalness, and significance to the parts of thinking (Paul and Elder, 2002). This research is designed with instructional activities in which one's own thoughts or others' thoughts are analyzed in terms of the parts of thinking and logic standards. Thinking education has become indispensable for all of us with the goal to develop the skills of inquiry and expression required for being critical thinker and media literate. That is to say, students are enabled to be equipped with these skills through having chance to interpret the media

messages and texts in terms of the parts of thoughts such as point of view, assumption, inference, conclusion, etc. and such standards as clarity, accuracy, precision, etc.

The definition of media literacy in a broader scope points out a critical interpretation of information on media. According to Mizukosi (1999 cited in Shibata, 2002), media literacy means multiple abilities including an interpretation of media information and an expression of feelings and opinions on these media information. Suzuki (1997 cited in Shibatai 2002) also defines media literacy as critical analysis and evaluation of media in a social context. Similarly, media literacy is defined as intersection of skills, giving people chance to think critically on information through the media such as the internet, newspaper, etc. and to express themselves in a creative way (Ichikawa, 1999 cited in Shibata, 2002). Scheibe and Rogow (2008) also emphasizes that being media literate depends on having skill of questioning, required to be critical thinker. Indah (2016) explains the importance of critical thinking in such a way that media texts have values, goals and point of view which belongs to conceptual framework requiring critical thinking. Worsnop (2004) gives importance to thinking critically on media text to get the meaning of the text by being aware of not only the values of the audience but also the values of texts. The most common word, used for the definition of media literacy is "thinking critically". It can be inferred that media literacy includes critical thinking. In this context, thinking critically in each part of life is an indispensable feature to be media literate. Feuerstein (1999) finds out that primary school students, having trained in terms of media literacy, became capable of thinking critically on TV series and newspaper advertisements. Indah (2016) reveals the difference between trained learners on media literacy and those, lack of media literacy training in terms of the use of higher order of critical thinking. The similar inference are made by Kubey (2002) stating students will have higher order critical thinking skills such as critical interpretation, analysis and evaluation in case they have been trained on media literacy. As identified by Ruggiero (2015), the students become aware of how to apply their critical thinking skills upon watching or reading media messages and texts as a result of specific exercises. The importance of media literacy in support of critical thinking is expressed by Feuerstein (1999) in such a statement "Media literacy aims to develop metacognitive reflective strategies by means of study and critical responses towards the content of the media and its messages." Moreover, it is aimed to "develop students' habits of inquiry and skills of expression they need to be critical thinkers, effective communicators and active citizens in today's world" (Facione, 1990). In a broader scope it can be concluded that these studies are the indicators of the relation between the education with the goals to develop media literacy skills and the development of critical thinking skills. According to Willingham (2019), the means of critical thinking is that "You are thinking critically if (1) your thinking is novel—that is, you aren't simply drawing a conclusion from a memory of a previous situation and (2) your thinking is self-directed—that is, you are not merely executing instructions given by someone else and (3) your thinking is effective—that is, you respect certain conventions that make thinking more likely to yield useful conclusions. These would be conventions like "consider both sides of an issue," and "offer evidence for claims made," and "don't let emotion interfere with reason."

Scheibe and Rogow (2008) explain basic ways to integrate media literacy and critical thinking into any curriculum. One of the ways is to give chance to students to be experienced in observing, critical thinking and perspective taking. According to them, this can be possible through such some instructional practices as (1) asking questions enabling students to think critically about information on media; (2) pointing out the possibility of different interpretation of media messages by people with different points of view; (3) discussing both printed and image or sound based texts on media; (4) enabling students to determine and

make comment on the latent elements of media messages such as the technique used to attract attention, the properties of individuals producing the media text, etc. (5) being model as a teacher presenting how to think critically on media texts. Another way for integration of media literacy and critical thinking into any curriculum is to enable students to search for information about the topic of   any media text. Because searching for various information and facts are compulsory to think critically on media messages or texts. The other ways are exemplified as "identifying how students' prior ideas about a topic have been influenced by media messages, using media as a pedagogical tool, identifying sources for erroneous beliefs about a topic, develop an awareness of issues of credibility and perspective, comparing the ways different media present information about a topic, using media as an assessment tool, facilitating the use of various media formats for transfer of opinions, etc." (Scheibe and Rogow, 2008). In similar, media literacy and critical literacy can be integrated into a curriculum in teacher education in such a way that the prospective teachers have a chance to practice thinking critically on media messages, interpreting the latent elements of media messages, following the process of thinking critically, modelled by their teachers and searching for information on the topic of media texts, questioning media messages by regarding such standards as clarity, accuracy, precision, relevance, depth, logic, breadth, significance, fairness, comparing the ways different media present information about a topic, discussing the different points of view of various media texts, analyzing media content in terms of misleading information on media texts. Therefore, it can be concluded that integration of media literacy and critical literacy into any curriculum can take place regarding the instructional points stated above. Moreover, equipped the students with these cognitive skills has become the educational goals from primary education to higher education. Therefore, the need for the integration of media literacy and critical literacy into any curriculum with being linked with any course or without depending on the content of any course has emerged.

Skolverket (2011 cited in Ekvall, 2013) lists the goals of education as equipping the students with such properties as being creative, competent and responsible and developing "their ability to examine facts and relationships critically". That is to say, Skolverket's views on the goals of education point out critical literacy, each individual should have to read and write critically. Luke (2012) defines the aim of critical literacy as criticizing ideologies, cultures, institutions and political systems and he adds that "as a practical approach to curriculum, it melds social, political and cultural debate and discussion with the analysis of how texts and discourses work, where, with what consequences, and in whose interests" (Luke, 2012). According to Comber and Simpson (2001), one of the domains in which critical literacy has been applied to curriculum is media. Moreover, it is offered by Sperry and Baker (2016) to increase students' awareness to critical literacy and teach them how to question media texts and messages critically. They add that questioning, analyzing texts, identifying points of view, making inferences and drawing conclusions are some learning outcomes obtained as a results of students' decoding content-rich texts (Sperry and Baker, 2016) . Media is considered to provide content rich texts written in multiple perspectives. Media products such as newspapers, reflecting their own political ideologies, need to be read critically (Wolk, 2003). Because of widespread use of media in our technological modern society today, Goodman (2005) adds that the ability to analyze, interpret, evaluate, and produce different forms of communication, such as media should be included in the definitions of critical literacy. Moreover, he emphasizes that "the students with their critical literacy skills investigate power relations within the social and historical context of their lived experience and within the broader frame of their mediated culture" (Goodman, 2005). Moreover, being literate depends on students' critical thinking skills and their reading between the lines to find the latent meanings (Tohidian & Khorsandi Taskoh, 2020). From

Kunnath and Jackson's points of view (2019), critical literacy means questioning the purpose and reliability of information, considering with multiple perspectives and taking action. Capturing the latent message, reading between the lines, questioning texts and messages, considering the context in which an information emerges, searching for additional information are possible for the individuals being critical literate (McLeod & Vasinda, 2008). As a result, critical literate students will become capable of interpreting media messages and using different media formats to express themselves.

Despite such an important educational goal, critical literacy is difficult to be integrated into curriculum (Kunnath and Jackson, 2019). Behrman (2006) explains the reason of the difficulty in integration as lack of instructional methods and strategies. According to Goodman (2005), critical literacy can be thought through such instructional practices and principles as teaching multiple literacies, teaching continuous inquiry and teaching reflection. It ıs inferred from Goodman's expressions that learning how to analyze, evaluate, interpret and generate texts in different forms such as oral, visual or textual is possible with the practices with the goals to teach multiple literacies. Another practice, suggested by Goodman (2005), is to have students question about their experiences and the social, cultural and historical conditions of these experiences and how the media represents these conditions and experiences. As a reflective activity, the students should have chance to reflect what the have learned, for example their own media products.

Behar-Horenstein and Niu (2011) emphasize ability to think critically is among higher education goals to build responsible citizens and add that "a society requires individuals to base their judgments and decisions on careful evaluation of evidence". Equipped the individuals with cognitive skills, including media literacy and critical literacy make their adaptation to the modern society easier because of learning how to analyze, interpret, evaluate an information critically based on facts.

Critical thinking and critical literacy are defined as a related concept, including critical reading and the difference in the meanings of these concepts is expressed as "critical thinking is a process, critical reading is an application, and critical literacy is an ability" (Jeong, 2012). To sum up, critical thinking is a process to be followed by both critical and media literate individuals. Namely, with an analogic point of view, critical thinking is an indispensable way to critical literacy and media literacy. These skills are the learning outcomes, aimed to be gained through curriculum in the field of teacher education in Turkey. Both educators and policy makers have emphasized each one should have life skills such as being media literate and critical literate. In the teacher education programs, such elective courses as "media literacy" and "critical and analytical thinking" aim to teach prospective teachers to be media literate and be critical thinker in each part of life and to be aware of the vital importance of such skills. Occurrence of media literacy course in teacher education programs is the evidence of media literacy education in Turkey. Therefore, media literacy becomes a skill, thought in its' own curriculum, not needing to be thought in other courses' curriculum. This shows the importance of media literacy education with its own curriculum in higher education in Turkey. Although there is a consensus on which media literacy is a skill that should be gained through school education, whether it is thought in its' own curriculum or other courses' curriculum is on debate in the world. For example, media literacy is usually taught in the "English" curriculum by teachers of English in Ontario, Canada (Shibata, 2002). That is to say, media education, the aim of which is to develop students' media literacy, is generally taught within the class hours allotted to other courses' curriculum, along with these courses' contents required to be taught. This means the frequency of media education in class depends on the teacher's decision on time allocated to instructional activities on media literacy. This can cause to move away from standardization. Because it is possible

enthusiastic teachers on media literacy separate much more time for teaching media literacy than less eager ones. Therefore, the component skills such as critical literacy and media literacy should be acquired independently from the curriculum of any course. Similar debate has occurred whether critical thinking should be thought in stand-alone subjects or whether it should be thought within any subject or discipline. The emergence of this debate depends on how to interpret critical thinking. While ones defining critical thinking as a generic set of skills associated with reasoning emphasize that critical thinking should be thought independently from any discipline (De Bono, 1973; Ennis 1987; Feuerstein, et all, 1980; Robinson, 2011), others relating critical thinking to any subject or discipline, believe that critical thinking should be thought within any subject or discipline (McPeck, 1981). Moreover, many studies indicate that critical literacy is thought being integrated in any course curriculum (Ekwall, 2013; Jeong, 2012; Park, 2012; Tohidian and Khorsandi Taskoh, 2020).

Considering Goodman's statement "Critical literacy aims to teach students the skills and capacity to read critically at this most developed level—in between the lines and beyond the lines—whether those lines are alphabetic, painted, videotaped, or spoken.", media texts, including different goals, points of view and values with various formats such as oral, written and visual, are appropriate to be thought critically on. Therefore, various media texts and messages were brought to class to be analyzed, evaluated and interpreted critically to develop prospective teachers' not only critical literacy but also media literacy through this study. Within this theoretical framework, the effects of thinking education on the prospective teachers' critical literacy and media literacy is purposed to be determined through both qualitative and quantitative data in this research.

2. Research Method

The study was conducted to determine the effects of thinking education, the course taken by the prospective teachers being trained at Education Faculty, Bartin University. In particular the effects of thinking education on the prospective teachers' such skills as critical literacy and media literacy were aimed to be presented via mixed method. Preference of mixed method is related to the purposes of the research, such as triangulation and complementation. According to Morse, (1991, as cited in Tashakkori & Teddue, 2003) mixed methods are classified as concurrent triangulation and sequential triangulation in terms of the sequence of data collection and the dominance of data sets. In this study sequential triangulation, gathering both qualitative and quantitative data sequentially, is used. Moreover, quantitative data was firstly gathered to give information on the prospective teachers' critical and media literacy skills before and after the research. Then, qualitative data was gathered to explain the phenomenon deeply. The prospective teachers' views on the classroom activities and the results of the activities on their skills were presented with the help of qualitative data. In contrast to other research methods, superiority of mixed method is emphasized by Tashakkori and Teddue (2003) stating the advantages of mixed method such as presenting different views, making strong inferences, answering to research questions not being able to be answered by other research methods.

The study group was selected by the sampling criteria, one of the purposive sampling methods. Voluntary participation in the study and doing the homework and worksheets regularly were the selection criteria of the study group. Therefore, the study was conducted with the participation of 40 social studies prospective teachers, taking selective course "Thinking Education" at Education Faculty, Bartin University during the 2016-2017 academic year. The participants haven't taken any course before, aiming to train students to

get thinking skills. The research was continued during 14 weeks. Weekly research design is presented below:

1ˢᵗ Week: The aim of the course named "Thinking Education" was presented and the participants were informed on the content and instructional methods. Critical Literacy scale and media literacy scale were applied to get quantitative data on the prospective teachers' literacy levels.

2ⁿᵈ and 3ʳᵈ Weeks: Theoretical information on thinking, thinking process and skills, thinking obstacles were given. Articles on thinking process and skills were examined. They were asked to define critical thinking with their own words. Moreover, their opinions on thinking obstacles and their suggestions on how to overcome these obstacles were taken. The fields in which they can think critically and not were defined.

4ʳᵈ and 5ᵗʰ Weeks: What is critical reading and how to read and think as regards logic elements was explained. The participants had experiences in reading and thinking as regards logic elements (aims, questions related to subject, assumptions, information, practice and results, concepts, viewpoint, inferences). The researcher became model on how to think on "being academician" in terms of logic elements. The participants were asked to define the effects of this activity on their critical literacy and media literacy.

6ᵗʰ and 7ᵗʰ Weeks: The students were asked to evaluate "thinking education course" in terms of logic elements. Then, they were asked to select any news, published on the newspaper or on the internet and evaluate it in terms of logic elements. Moreover, the news were analyzed in terms of the standards such as accuracy, clearness, logic, importance, relevance, etc.). The participants were asked to define the effects of this activity on their critical literacy and media literacy.

8ᵗʰ Week: The news, presenting an event from different point of views were compared. The students were asked to find such news and compare them in terms of their viewpoint. Then, they shared the news and their evaluation on the news with other participants. The participants were asked to define the effects of this activity on their critical literacy and media literacy through the figure. They chose the figure, symbolizing their critical and media literacy most correctly and explained the reason of their choices.

9ᵗʰ Week: What is "disinformation" in media was explained and examples of disinformation were examined. The students were asked to give an example of disinformation and analyze it. Then, they shared their examples and their thoughts on the news in terms of disinformation with other participants. The participants were asked to define the effects of this activity on their critical literacy and media literacy.

10ᵗʰ-11ᵗʰWeeks: The participants were asked to find news, written prejudicially. The news were analyzed in terms of prejudice and perspective. They were asked to write the text again objectively. The participants were asked to define the effects of this activity on their critical literacy and media literacy.

12ᵗʰ -13ᵗʰ Weeks: How to think critically on advertisements was studied. Some advertisements were analyzed. The participants were asked to choose an advertisement to be analyzed. After having analyzed it, they shared their studies with other participants. Therefore, their criteria in analyzing advertisements, their views on advertisement before and after the activity, the effects of the activity on their critical literacy and media literacy were questioned.

14ᵗʰ Week: Thinking education was evaluated by the participants in terms of learning outcomes, instructional methods and the instructional activities. Then, the effects of thinking education on their critical literacy and media literacy were questioned. They made

suggestions on thinking education. At the end of the education critical literacy scale and media literacy scale were applied to get quantitative data on the prospective teachers' literacy levels.

2.1. Data Collection Tools

2.1.1. Quantitative Data

The prospective teachers' media literacy was determined before and after "Thinking Education" with the help of "media literacy scale" developed by Karaman and Karatas (2009). The scale was designed as a 5-category Likert-type scale. The scale was scored as "(1) never", "(2) rarely", "(3) sometimes" "(4) frequently" and "(5) always". Exploratory factor analysis indicates that the scale has a structure of 3 factors consisting of 17 items. The first factor that consists of 7 items is named "having knowledge"; the second factor that consists of 6 items is named "analyzing and giving reaction"; the third factor that consists of 4 items is named "judging and getting an implicit message". Three factors altogether explain 42,5 of the total variance. Cronbach's Alpha of reliability for the whole scale is .840 and the factors' reliability values are.721, .705 and .680 respectively.

Critical Literacy Scale developed by Yilmaz (2013) was applied to the prospective teachers before and after education. The scale designed as a 5-category Likert-type scale was scored as "(1) never", "(2) rarely", "(3) sometimes" "(4) frequently" and "(5) always". Exploratory factor analysis indicates that the scale has a structure of 2 factors consisting of 14 items. The first factor, consisting of 7 items, is named as "critical reading"; the second factor, composed of 7 items is named as "critical writing". Two factors altogether explain 50,937 of the total variances. Cronbach's alpha of reliability for the whole scale is .82, and Cronbach's alphas for the scale's factors are .76 and .71 respectively, indicating the scale's reliability.

2.1.2. Qualitative Data

Journals, including open-ended questions, were collected from the prospective teachers during 14-week research. Journals, in which the questions were asked to get knowledge on the prospective teachers' media and critical literacy, were gathered before and after "Thinking Education". Moreover, the data about the effects of each instructional activity on the prospective teachers' both critical and media literacy were gathered after each instructional activity through journals. The prospective teachers also evaluated their critical literacy and media literacy both at the beginning and at the end. Moreover, the prospective teachers' general evaluation on each instructional activity (goals and objectives gained after an activity, instructional methods, etc.); the effects of an activity on their critical and media literacy; the problems, encountered in an activity; suggestions on how to overcome the problems were emphasized through journals. These types of questions were asked at the end of each instructional activity. Therefore, journals were expected to show the prospective teachers' improvement in media literacy and critical literacy from first to last. The questions in the journals were evaluated by an expert, a professor in the department of curriculum and instruction studying on critical thinking, in terms of such criteria as understandability, clearness, content validity, number of question, etc.

2.2. Data Analysis

SPSS 22 program was used to analyze quantitative data. Pre and post-test mean scores gained from both critical literacy scale and media literacy scale were tested to indicate whether there is any statistically meaningful difference in the prospective teachers' critical and media literacy level before and after thinking education. Paired sample t test was applied to determine whether there was a statistically significant difference in pre-test and post-test scores gained from critical literacy scale. The same process was followed for analysis of the

quantitative data obtained from media literacy scale. Paired sample t test was applied to present whether difference between pre and post-test scores of critical literacy occurred or not.

The qualitative data was analyzed through content analysis method in seven phases. (i) Organizing the data, (ii) immersion in the data, (iii) generating categories and themes, (iv) coding the data, (v) offering interpretations through analytic memos, (vii) searching for alternative understandings and (viii) writing the report for presenting the study. The data were reread and notes were taken to organize data. The data were also organized according to what was gathered and when, where, how, from whom the data were gathered. Then, Schemas for recording data were used to manage data and guard against losing the findings. Categories and themes were generated. Then, the data were coded. Generated themes and codes were interpreted. In other words, interpretation means making sense of the findings, drawing conclusions and making inferences. Then, all generated codes and themes were searched for alternative understandings again.

2.3. Reliability and Validity Studies

The prospective teachers' voluntarily participation in the research and their responsible behaviors in keeping journals during the research are the factors, providing internal validity of the study. Moreover, statistical analysis of data collection tools such as Cronbach's Alpha Reliability values and exploratory factor analysis findings, supports reliability and validity of the study. The course syllabus was designed by both researcher and a professor studying on how to design critical thinking activities and they together instructed the prospective teachers. The course and the data gathered after each instructional activity were evaluated at each week. Reformation on the following instructional activities was done regarding these evaluations.

Strategies to provide internal validity for qualitative side of the research were external audits, rich explanations, a set of evidence and triangulation. (Creswell, 2003). In this sense, detailed description of instructional process, presenting findings together with quotations, gathering both qualitative and quantitative data to explain the findings in detail are the strategies for the internal validity of the study. In addition, themes, codes and qualitative data together were reviewed by an expert and the reliability of coding was proved by Miles and Huberman's reliability formula (1994) [Reliability=Agreement/(Agreement+Disagreement)]. Also, agreement score was found as 94.5 The calculated intercoded reliability are thought to prove the internal validity of the study.

3. Findings

3.1. Findings of Quantitative Data

The results of paired samples t-test for determining whether pre and post-test mean scores for media literacy differed statistically or not are presented in Table 1.

Table 1. *Comparison of Pre and Post Test Scores for Media Literacy: Paired Samples T-Test Results*

	Factors	Test Time	n	Paired Samples Correlations		Mean	sd	df	t	p
				Correlation	p					
Media Literacy	**Having Knowledge**	Pre-test	38	,244	,140	29,57	3,19	37	2,835	,007
		Post-test	38			36,46	15,44			
	Analyzing and Giving Reaction	Pre-test	38	,262	,112	24,76	9,29	37	1,818	.077
		Post-test	38			29,06	13,95			
	Judging an Implicit Message	Pre-test	38	,376	,020	14,89	2,54	37	4,390	.00
		Post-test	38			16,81	2,25			
	The Whole Scale	Pre-test	38	,276	,094	69,22	11,82	37	3,543	.001
		Post-test	38			82,33	23,04			

Note. p<.05

The difference between pre-test and post-test mean scores gotten from media literacy scale was observed statistically (t37 =3,543; p=.001). Pre-test mean score for media literacy was calculated to be 69,22 with a standard deviation of 11,82; post-test mean score was 82,33 with a standard deviation of 23,04. Moreover, pretest mean scores for such factors of the scale as "having knowledge" and "judging and getting an implicit message" differs from post-test mean scores statically (t37 =2,835, p=.007; t37 =2,835, p=.00). For the first factor named "Having Knowledge", pre-test mean score was calculated as 29,57 with a standard deviation of 3,19; post-test mean score was 36,46 with a standard deviation of 15,44. That pre-test mean score on the factor of "judging and getting an implicit message" was higher than post-test mean score proves the statistical difference between the test scores. It can be inferred from these findings that the prospective teachers' post-test media literacy scores have increased compared to their pre-test scores. Furthermore, their post-test mean scores have increased in having knowledge, judging and getting an implicit message. It was also observed that pre and post-test scores of the second factor, informing how the prospective teachers can analyze and give reactions, didn't differ statistically. Compared to second factor named "Judging and Getting an Implicit Message", there isn't any statistically meaningful correlation between pre and post-test scores.

The findings on the difference of pre and post-test mean scores for critical literacy, attained through paired samples t test, are presented in Table 2.

Table 2. *Comparison of Pre and Post-Test Scores for Critical Literacy: Paired Samples T-Test Results*

	Factors	Test Time	n	Paired Samples Correlations		Mean	sd	df	t	p
				Correlation	p					
Critical Literacy	**Critical Reading**	Pre-test	38	,212	,202	26,59	2,81	37	2,464	,019
		Post-test	38			31,39	12,29			
	Critical Writing	Pre-test	38	-,033	,846	25,32	5,73	37	2,256	,030
		Post-test	38			25,32	16,40			
	The Whole Scale	Pre-test	38	,036	,831	51,91	6,87	37	3,275	,002
		Post-test	38			63,14	20,23			

Note. p<.05

Upon viewing Table 2, a statistically significant difference is observed between pre and post-test mean scores for critical literacy (t37 =3,275; p=.002). While pre-test mean score for

critical literacy was calculated to be 51,91 with a standard deviation of 6,87; post-test mean score was 63,14 with a standard deviation of 20,23. Pre-test mean score for critical reading was calculated as 26,59 with a standard deviation of 2,81 and post-test mean score for critical reading was 31,39 with a standard deviation of 12,29. Thus, it is proven that pre-test mean scores for critical reading differed from posttest mean scores statistically. The similar findings were observed for critical writing. In a short, pre-test mean scores for both critical reading and writing differed from post-test mean scores statistically. Moreover, these findings are supported with the correlation values between pretest and post-test mean scores for both critical writing and reading.

3.2. Findings of Qualitative Data

The results of qualitative data analysis on learning outcomes of thinking education are presented in Table 3.

Table 3. *The Results of Qualitative Data Analysis on Learning Outcomes of Thinking Education*

Themes		Codes	Frequency (f)
Learning Outcomes	**Knowledge**	Realizing that media messages can be biased	3
		Realizing that an event or situation may have hidden causes	3
		Understanding what thinking means	2
		Knowledge of thinking skills	1
		Understanding what media literacy means	1
		Understanding what critical literacy means	1
	Affective Features	Having positive attitudes towards the course because of an interactive learning environment	4
		Avoiding from making a judgement with lack of knowledge	3
		Having positive attitudes towards making research	3
		Believing improvable thinking skill through education	1
		Accepting the importance of listening	1
		Opposing the acceptance of information without being questioned	1
		Recognizing the importance of moving away from prejudices	1
		Caring about different thoughts	1
	Skills	Critical thinking	28
		Questioning media messages	9
		Questioning social media messages	4
		Being objective	3
		Reseach skills	3
		Emphathy	3
		Cooperation	2
		Creative thinking	2
		Awareness of the thinking process	1

When Table 3 is examined, it is seen that the learning outcomes are defined under the themes which are knowledge, affective features and skills. Under the theme knowledge; the most frequently expressed codes are *"realizing that media messages can be biased"* (f=3) and "*realizing that media messages as well as events or situations may have hidden causes''* (f=3). Some of the opinions of the participants about affective features include *''having positive attitudes towards the course because of an interactive learning environment''* (f=4); *''avoiding from making a judgement with lack of knowledge''* (f=3) and *''having positive attitudes towards making research''* (f=3). In addition, it is clear that '*'critical thinking*

skills'' (f=28) is the most expressed code by the participants under the theme skills. The following excerpts are related to the themes and codes above.

''My ability to evaluate circumstances from a different point of view, empathize, think critically and distinguish my feelings and logic has increased.'' (prospective teacher 18)

''After class, I really find out that thinking can be taught and I am unprejudiced about thinking education now.'' (prospective teacher 8)

''I am more critical of the news or advertisement texts I encounter on TV or social networking sites.''(prospective teacher 11)

''While I was reading a text in this course, I realized that I had to think thoroughly. I have learned to empathize and think by considering different feelings and thoughts. I think I have gained critical thinking skills. First of all, I start giving importance to be knowledgeable.'' (prospective teacher 7)

''I have realized what thinking is. I have learned that purposeful thinking is real thinking and everything we watch in media is not true. Now, I am able to discover the message in advertisements of companies branded with advertising analysis. Also, I question the reliability of the products.'' (prospective teacher 1)

The qualitative data analysis results related to the positive effects of thinking education on the prospective teachers' critical literacy are presented in Table 4.

Table 4. *The Effects of Thinking Education on the Prospective Teachers' Critical Literacy: Qualitative Data Analysis Results*

Themes			Codes	f
Positive Effect	**Critical Literacy**	**Feature**	Questioning everytime	13
			Being a researcher	6
			Doubting the accuracy of the information	5
			Examine any text from different perspectives	5
			Using different sources of information	1
		Transferability	Being a critical thinker in all areas of life	3
		Affective Feature	Gaining critical literacy awareness	18
			Understanding the importance of critical literacy	3
		Media Literacy	Thinking on media messages critically	12
			Analyzing media messages in detail	10
			Noticing the implicit media messages	7

When Table 4 is analyzed, it is seen that thinking education has a positive effect on the prospective teachers' critical literacy. The participants state that thinking education affects them under the theme feature in terms of *"questioning everytime"* (f=13); *"being a researcher"* (f=6); *"doubting the accuracy of the information"* (f=5); *"examining any text from different perspectives*" (f=5) and '*'using different sources of information''* (f=1). In addition, they are of the opinion that as a critical thinker in all areas of life they have the ability to transfer the acquired critical thinking skills into daily life under the theme transferability. It is evident that they acquire positive features related to critical literacy such as *"gaining critical literacy awareness"* (f=18) and *"understanding the importance of critical literacy"* (f=3) under the theme affective feature. It is found out that the participants gain some skills under the theme media literacy such as *"thinking on media messages critically"* (f=12); *"analyzing media messages in detail"* (f=10) *and "noticing the implicit media messages*" (f =7). It is concluded that thinking education course contributes to the participants' media literacy level. Direct quotations on these themes and codes are given below.

''Although I used to get the information without questioning and thinking enough, now, I think more critically thanks to the activities in this course.'' (prospective teacher 23)

''The ad analysis, activities and assignments we have done in the course have improved my critical perspective by enabling me to be more inquisitive to events, situations and advertisements, to learn the actual reasons of events, and to find out positive and negative aspects of ads and events.'' (prospective teacher 26)

''I used to read the news superficially and <u>unquestioningly</u>, but now I evaluate the news, events and texts in terms of some criteria. I make comments and inferences by examining the accuracy, importance and reliability of the news within the framework of logic components.'' (prospective teacher 3)

''I care about accessing different sources. Questioning information presented from different perspectives from different sources has increased my critical literacy.''(prospective teacher 7)

''I learned what critical literacy is and why it is necessary. I can easily use these skills in my life.'' (prospective teacher 18)

''I have realized that critical literacy is important in my life. I constantly encounter news and new information in my daily life. I accepted new information without questioning before taking this course. After this course, I have started thinking systematically. I have learned how to become a critical literate.'' (prospective teacher 21)

The qualitative data analysis results related to the positive effects of thinking education on the prospective teachers' media literacy are presented in Table 5.

Table 5. *The Effects of Thinking Education on the Prospective Teachers' Media Literacy: Qualitative Data Analysis Results*

		Themes	Codes	f
Positive Effect	**Media Literacy**	Critical thinking	Questioning media messages	17
			Noticing the implicit media messages	2
			Examining media messages from different perspectives	2
		Affective Feature	Awareness of being a media literate	13
		Objectivity	Discovering bias of media messages (ideology, etc.)	7
			Reading media messages objectively	3
		Access to Information Sources	Evaluating media messages using different sources of information	5
			Being a researcher	1
		Theoretical Knowledge	Having theoretical knowledge about media messages analysis	3

According to Table 5, it is understood that the effects of thinking education on the prospective teachers' media literacy are positive. The participants state their opinions related to their improvement in media literacy under the theme critical thinking and affective feature as follows respectively; *''questioning media messages''* (f=17); *''noticing the implicit media messages''* (f=2); *''examining media messages from different perspectives''* (f=2) and *''awareness of being a media literate'' (f=13). The codes under the theme objectivity are ''discovering bias of media messages''* (f=7) and '*'reading media messages objectively''* (f=3). The participants' opinions under the theme access to information sources and theoretical knowledge include '*'evaluating media messages using different sources of information''* (f=5); *''bei*ng a researcher'' (f=1) and ''having theoretical knowledge about

media messages analysis'' (f=3). Below are some responses of the participants regarding the themes and codes above.

''I had a superficial perspective while following media. After the course, I'm more concerned with the authenticity of the text in media. While I was at the stage of conducting ideas from a single source, now I have learned that evaluation of opinions from different sources is necessary.'' (prospective teacher 2)

''Thinking education course has enabled us to evaluate news, ads etc. from a more in-depth and questioning perspective.'' (prospective teacher 23)

''I realize that I can not read, watch, and understand media and I can not notice the implicit media messages.'' (prospective teacher 24)

''I find out that I should not believe ads blindly. I learn to question the accuracy of them.'' (prospective teacher 26)

''I hardly knew the systematic conceptual and theoretical information I needed for media literacy. Thanks to this course, I learn how to become a conscious media literate and I can use it in my life.'' (prospective teacher 5)

''I do not believe in every news in media, I do a deep research and evaluate it within the context of logic components.'' (prospective teacher 9)

The results of quantitative data analysis on why thinking education is recommended by the prospective teachers is presented in Table 6.

Table 6. *The Results of Quantitative Data Analysis on Why Thinking Education is Recommended*

Themes			Codes	f
Reasons for Recommendation		Learning and Teaching Process	Use of instructional methods and Techniques (discussion, brainstroming, case study, etc.)	5
			Interactive participation	2
			Analysis of case studies	2
			Homeworks facilitating learning	1
	Learning Outcomes	Knowledge	Discovering thinking skills	2
		Skill	Being a critical literate	9
			Considering different perspectives	7
			To obtain questioning skills	6
			Being a media literate	3
		Affective Feature	Positive attitude towards thinking education (usefulness, necessity, motivation, etc.)	14
			Awareness	3
			Objectivitiy	2
			Research awareness	2
			Being curious	1
		Transferability	Transfering to daily life	4

According to Table 6, it is clear that all of the prospective teachers make recommendations for taking the thinking education course. *''Learning and teaching process'', 'knowledge'', ''skill'', ''affective features''* and *''transferability''* are the themes that emerged regarding the recommendations of thinking education. Under the theme learning and teaching process, the reasons of the participants to recommend thinking education course include *''use of instructional methods and techniques''* (f=5); *''interactive participation''* (f=2); *''analysis of case studies''* (f=2) and *'*'homeworks facilitating learning''* (f=1). The most frequently produced codes under the themes knowledge and skill are as follows respectively; *''discovering thinking skills''* (f=2); *'*'being a critical literate''*

(f=9) and '*'considering different perspectives''* (f=7). Contributions of thinking education are expressed by the codes under the theme affective features such as '*'positive attitude towards thinking education''* (f=14) and *''awareness''* (f=3).*''Transferring to daily life''* (f=4) is the only code under the theme transferability. The opinions of the participants in this regard are as following:

> *''I suggest that all of my friends should take the thinking education course as it allows me to think more, think consciously, question, and evaluate critically.''* (prospective teacher *26)*

> *''This course positively adds value to my worldview and increase my awareness level in response to events.''* (prospective teacher 11)

> *''It is a necessary course to develop thinking skills. In addition, it is a course that allows to gain thinking skills by getting rid of stereotypes and routine perspectives.''* (prospective teacher 5)

> *''It was interesting to do critical thinking studies on news and ad texts. I think everyone should experience this.''* (prospective teacher 7)

It is observed that the prospective teachers define their critical literacy levels by using negative adjectives before thinking education. The produced adjectives provide information regarding the prospective teachers' thinking actions, ways of thinking and competency levels. Before thinking education, the prospective teachers produce adjectives which emphasize that they are not competent in critical thinking and questioning. Some of these adjectives are *"not thinking", "not questioning", "not researching", "not criticizing"* and *"superficial"*. It is seen that the prospective teachers produce adjectives that describe their critical literacy levels as beginner, weak, inadequate, limited, few, etc. These adjectives mean that they are not competent to be critical literate. In addition, the prospective teachers define their critical literacy levels by using some adjectives such as stereotype, narrow-minded, simple, biased and non-objective. After thinking education, it is observed that they define their critical literacy levels by using positive adjectives. They define critical thinking processes by using some adjectives such as *criticizing, questioning, researching, thinking, examining*, etc. In addition, it is understood from the adjectives used by the prospective teachers that their critical literacy competency perceptions have increased. Some of these adjectives are *adequate, active, skillful, very, strong, advanced,* etc. Also, it is clear that the prospective teachers define their critical literacy as *neutral, deep thinking, different perspectives, objective, realistic* and *detailed.* These adjectives emphasize the depth and neutrality of the prospective teachers related to thinking education.

It is observed that the prospective teachers define their media literacy levels by using negative adjectives that symbolize their thinking actions, thinking types, competency levels and attitudes before thinking education. It is seen that adjectives used show that they do not have thinking skills before thinking education. For instance, *not questioning, not researching, not examining, not thinking,* etc. among these adjectives. It is seen that the prospective teachers produce adjectives that describe their media literacy levels as beginner, weak, inadequate, limited, few, etc. These adjectives mean that they are not competent to be media *literate.* Adjectives produced in this context are *biased, subjective, narrow-minded* and superficial. It is understood from the adjectives produced before thinking education that the importance of media literacy is questioned. These adjectives are *unplanned, aimless, random, unnecessary, careless,* etc. After thinking education, it is clear that some thinking skills such as criticism, scrutiny, inference, comparison, etc. are acquired. The adjectives produced by the prospective teachers are *researching, questioning, criticizing, deducing, comparing, discussing*, etc. It is understood from these adjectives that they develop positive competence

perceptions regarding media literacy after education. The prospective teachers define their media literacy as *objective and in-depth*, which means that media literacy contributes them to be objective and adopt a deep-thinking approach. It is concluded that, after thinking education, adjectives emphasizing the importance of media literacy and the desire to be media literate are produced by the prospective teachers. These are *necessary, important, purposeful, caring, willing to think*, etc.

The qualitative data analysis results related to figures symbolizing the prospective teachers' self-efficacy on critical literacy after thinking education are presented in Table 7.

Table 7. *Qualitative Data Analysis Results of Figures: Symbolizing the Prospective Teachers' Self-efficacy on Critical Literacy*

Theme	Codes	Frequency (f)
Figure A (f=1) you / critical literacy	Not needing	1
Figure B (f=8) you / critical literacy	Need for different experiences	4
	First experience	2
	Need for specialization	1
	Not being knowledgeable enough	1
	Habits	1
Figure C (f=9) you / critical literacy	Being critical	2
	Concept knowledge	1
	Being able to solve problem	1
	Evidence search	1
Figure D (f=20) you / critical literacy	Obtaining critical literate identity	10
	Learning how to read critically	7
	Content knowledge	2
	Getting experience	2
	Reinforcement of Information	1
	Gaining self-confidence	1
	Independence from prejudices	1
	Having a positive attitude	1

When Table 7 is analyzed, most of the prospective teachers (f =20) stated that the figure that symbolizes their critical literacy level is "D" after the course. Figure 'D' emphasizes the intersection of the participants' competencies and critical literacy. It is understood that the participants who chooses this figure consider themselves completely competent in terms of critical thinking. The reasons for choosing this figure include *"obtaining critical literate identity"* (f = 10); *"learning how to read critically''* (f=7); "*content knowledge*" (f=2); *"getting experience"* (f=2); *"reinforcement of information"* (f=1); "*gaining self-confidence*" (f=1); *"independence from prejudices"* (f=1) and '*having a positive attitude"* (f=1).

Secondly, the participants (f=9) choose the figure 'C' that symbolizes their critical literacy level. Figure 'C' symbolizes the intersection of the participants' competencies and critical literacy. It is understood that the participants who chooses this figure consider themselves competent in terms of critical thinking. The reasons for choosing this figure include "*being critical*" (f=4); *"concept knowledge"* (f =1); *"being able to solve problem"* (f =1) and *''evidence search''* (f=1).

The participants (f=8) choose figure 'B' that symbolizes their partial critical literacy. Figure 'B' symbolizes the partial intersection of the participants' competencies and critical literacy. The reasons for choosing this figure include *''need for different experiences''* (f=4); *"first e*xperience'' (f=2); ''need for specialization'' (f=1); ''not being knowledgeable enough'' (f=1) and *''habits''* (f=1). Below are some responses from different participants.

> *''While figure A symbolizes me before the course, figure C symbolizes me better after the course. Now, I question what I read by getting rid of prejudices.'' (prospective teacher 16)*

> *''Figure B symbolizes me, because I'm just learning and experiencing critical literacy. I believe I will improve myself in time.''* (prospective teacher 27)

> *''Figure B is suitable for me, because I think that I am a critical thinker thanks to the activities in thinking education course. However, there are still situations where we are affected by our environment. We cannot be sufficiently a critical literate because of our upbringing.''* (prospective teacher 24)

> *''Figure D symbolizes me. Critical literacy has became a part of my life after this course. I can be a critical literate in every area of my life with the concepts I have learned.'' (*prospective teacher 21)

> *''Figure D symbolizes me. I was interested in this subject and tried to improve myself in the past. I have gained necessary systematic information on this subject thanks to this course and I have learned critical thinking to the full. This skill is reinforced by different activities during the course.''* (prospective teacher 5)

> *''Figure C symbolizes me. I think that I have learned to be a critical literate after this course. Now, I examine what I read in more detail. I care about making inferences by accessing different sources.''* (prospective teacher 7)

> *''Figure D has become a phenomenon that constitutes my critical thinking self after taking the course.''* (prospective teacher 3)

The qualitative data analysis results related to figures symbolizing the prospective teachers' self-efficacy on media literacy after thinking education are presented in Table 8.

Table 8. *Qualitative data Analysis Results of Figures: Symbolizing the Prospective Teachers' self-efficacy on Media Literacy After Thinking Education*

Theme	Codes	Frequency (f)
Figure A (f=1) you media literacy	Not needing	1
Figure B (f=3) you media literacy	Need for specialization	1
	Need for experience	1
	Carefully review media messages	1
Figure C (f=13) you media literacy	Questioning	5
	Discovering the bias of the media	3
	Being curious	1
	Media literacy awareness	3
Figure D (f=17) you media literacy	Obtaining media literacy identity	6
	Gaining self-confidence	1
	Researching for media resources	3
	Questioning	3
	Observing different perspectives	1
	Following media	1
	Having experiences	1
	Need	1
	Noticing media meassages	1
	Being critical	1
	Continuous interaction with the media	1

According to Table 8, it is seen that the prospective teachers express their media literacy levels with figure ''C'' (f=13) and figure ''D'' (f =17) after the course. Figure ''D'' emphasizes the complete intersection of the participants' competencies and media literacy. Figure ''C'' symbolizes this intersection to a great extent. In this context, it can be thought that media literacy competency perceptions of the participants who choose figure 'C' and 'D' are high. The reasons for choosing figure ''D'' include *''obtaining media literacy identity''* (f=6); '*'researching for media* resources'' (f=3); *''questioning''* (f=3); '*'gaining self-confidence''* (f=1); '*'observing different perspectives''* (f=1); '*'following media''* (f=1); '*'having experiences''* (f=1); *''need''* (f=1); '*'noticing media messages''* (f=1); '*'being critical''* (f=1) and *''continuous interaction with the media''* (f=1). The reasons for choosing figure ''C'' include *''questioning''* (f=5); '*'discovering the bias of the media''* (f=3); '*'media literacy awareness'' (*f=3) and '*'being curious''* (f=1). The participants (f=?) choose figure 'B' that symbolizes their partial critical literacy. Figure 'B' emphasizes the partial intersection of the participants' competencies and media literacy. The reasons for choosing figure ''B'' include *''need for specialization''* (f=1); '*'need for experience''* (f=1) and *''carefully review media messages''* (f=1). In this regard, the opinions of the participants are reflected by the following comments:

> *''Figure B symbolizes me. I try to examine the news in media by accessing information sources from now on.''* (prospective teacher 26)

> *''I choose Figure D. I can notice the implicit media messages.''* (prospective teacher 30)

''Figure B symbolizes me. I cannot see myself fully enough. However, my perspective has changed positively compared to before I took the course.'' (prospective teacher 7)

''Figure D symbolizes me. I review media from a questioning perspective. I access different sources before believing in news.'' (prospective teacher 10)

''Figure D symbolizes me. I evaluate news in media in a critical approach.'' (prospective teacher 35)

''Figure C symbolizes me. I think I am a better media literate than before.'' (prospective teacher 25)

''Figure D symbolizes me. I read a lot of news and try to follow media. I do not accept every new information without questioning. Thanks to this course, I actually discover how this questioning process works. I also learn to think within the framework of logic components and standards.'' (prospective teacher 21)

Critical and media literacy self-evaluation results of the prospective teachers after media message reading and evaluation activity are presented in Table 9.

Table 9. *Critical and Media Literacy Self Evaluation Results After Media Message Reading and Evaluation Activity*

Themes		Codes	Frequency (f)
Competency Perception on Media and Critical Literacy	Very competent or competent (18)	Following different media sources	7
		Learning how to question media messages	7
		Discovering the bias of media messages	5
		Making inferences	3
		Evaluating as regards logic components	3
		Being objective	2
		Getting rid of prejudices	1
		Being curious	1
		Being researcher	1
	Partially competent (6)	Influence of belief / value / ideologies	2
		Media bias	2
		Lack of knowledge	1
		Striking media messages	1
	Not competent (6)	Biased media mesaages	2
		Not following media	1
		Ideological commitment	1
		Education system as an obstacle	1
		Lack of knowledge/not researching	1

When Table 9 is examined, it is clear that the participants generally find themselves competent in terms of critical and media literacy in the process of examining and analyzing media messages. Indicators of their competences are defined by the codes under the theme very competent or competent which include "*following different media sources''* (f=7); *''learning how to question media messages''* (f=7); *''discovering the bias of media messages''* (f=5); '*'making inferences''* (f=3); *''evaluating as regards logic components''* (f=3); ''being objective'' (f=2); '*'getting rid of prejudices''* (f=1); '*being curious''* (f=1) and *''being researcher''* (f=1). The participants consider themselves partially competent in terms of critical and media literacy because of some factors such as '*'influence of belief/value/ ideologies''* (f=2); '*'media bias''* (f=2); '*'lack of knowledge''* (f=1) and '*'striking media messages''* (f=1) which are the codes expressed under the theme partially competent. In addition, the reasons why they do not consider themselves competent are explained by the

codes under the theme not competent which are *"biased media messages*" (f=2); *"not following media"* (f=1); "*ideological commitment*" (f=1); "*education system as an obstacle*" (f=1) and "*lack of knowledge/not researching*" (f =1). Direct quotations of the participants are as follows:

> *''...While watching or listening to media, I try to question events from different perspectives as much as possible.''(prospective teacher 33)*

> *''I follow written and visual media. I access and evaluate different sources to understand the accuracy of information.'' (prospective teacher 19)*

Qualitative data analysis results on the effect of ad analysis on media and critical literacy are presented in Table 10.

Table 10. *Qualitative Data Analysis Results on The Effect of Ad Analysis on Media and Critical Literacy*

Themes		Codes	Frequency (f)
Positive Effect	Critical Literacy	Questioning	15
		Critical thinking	10
		Reviewing ads with different perspectives	2
		Researcher identity	1
		Understanding hidden message of advertisements	5
		Questioning the purpose of the advertising elements	1
		Accessing information sources	1
		Incident, situation, etc. analysis with logic components	1
	Media Literacy	Understanding hidden message of advertisements	10
		Questioning messages of advertisements	9
		Being a media literate	8
		Change in ads perception	5
		Paying attention to ads messages	5
		Having experience in ads analysis	4
		Analyzing ads regarding criteria	4
		Exploring the purpose of advertising elements	2
		Reviewing ads with different perspectives	2

The qualitative analysis results in Table 10 show that the participants' ad analysis experiences positively affect their critical and media literacy. The positive contribution of ad analysis to critical literacy of the participants is explained by some codes. These codes show the participants' competences in terms of critical literacy after ad analysis. The most frequently expressed codes under the theme critical literacy include '*'questioning''* (f=15); *''critical thinking''* (f=10); '*'understanding hidden message of advertisements''* (f=5) and '' reviewing ads with different perspectives'' (f=2). Other codes are as follows; '*'researcher identity'* (f=1); '*'questioning the purpose of the advertising elements''* (f=1); '*'accessing information sources''* (f=1) and '*'incident, situation, etc. analysis with logic components''* (f=1). The codes under the theme media literacy showing positive contribution of ad analysis to the media literacy of the participants include *''understanding hidden message of advertisements''* (f=10); '*'questioning messages of advertisements''*(f=9); '*'being a media literate''* (f=8); '*'change in ads perception''* (f=5); '*'paying attention to ads messages''* (f=5); *''having experience in ads analysis''* (f=4); '*'analyzing ads regarding criteria''* (f=4); '*'exploring the purpose of advertising elements''* (f=2) and '*'reviewing ads with different perspectives''* (f=2). The following excerpts are related to these themes and codes.

> *''From now on, I can evaluate the ads from a critical perspective. I am aware of the fact that each ad has a purpose and includes hidden messages for this purpose. I realize that*

the use of the features such as color, light etc. is related to the purpose of ad.''(prospective teacher 18)

''Advertising is the most important message tool for the promotion of a product. Experiencing ad analysis has had a positive impact on media and critical literacy. I have gained different perspectives. I realize that I need to review information more critically and have knowledge about subject thanks to ad analysis. Thus, I have become a real researcher.'' (prospective teacher 2)

''Ads that have not caught my attention interest me now. I think my media literacy has improved as I make ad analysis.'' (prospective teacher 27)

''I have gained the ability to think consciously and I often practice what I have learned during thinking education course.'' (prospective teacher 16)

''I have started thinking more comprehensively and systematically. I am more conscious while thinking.'' (prospective teacher 25)

''After education, I evaluate by using different thoughts and resources and taking into account different points of view within the criteria such as accuracy, consistency, etc..'' (prospective teacher 22)

Qualitative data analysis results on evaluation of thinking education regarding logic elements are presented in Table 11.

Table 11. *Qualitative Data Analysis Results on Evaluation of Thinking Education Regarding Logic Elements*

Logic Elements	Themes	Codes	Frequency (f)
Views on the purpose of thinking education	Awareness	Awareness of thinking ways	5
		Understanding what thinking means	4
		Needing to think	3
		Awareness of learning ability of critical thinking	2
	Skill	Gaining critical thinking skill	13
		Questioning the knowledge	2
		Focusing on research	2
		Thinking skills with logic components	2
		Caring for different perspectives	2
	Personal Development	Providing personal development in thinking skills	4
Assumptions about Thinking Education		Developing a positive attitude towards the course	6
		Learning to think	4
		Acquiring thinking skills	2
		Providing personel development	1
		Learning environment encouraging thinking	1
		Getting different perspectives	1
		Self evaluation on thinking skills	1
		Transfering thinking skills to life	1
Process and Results	Learning and Teaching Process	Question and answer	4
		Brainstorming	4
		Six thinking hats	1
		Snowball technique	1
		Concept map	1
		Technology assisted instruction	1
		Case study	1
	Results	Encouraging critical thinking	8
		Encouraging to question	4
		Observing different perspectives	4
		Associating	1

	Making a synthesis	1
	Evaluation	1
	Making inference based on research	1
	Transfering critical thinking to life	1
	Analyzing with logic components	1
	Understanding what thinking means	1
Possible Perspectives on thinking education	Being necessary	4
	Being useful	4
	Development of thinking skills	3
	Being effective	2
	Transferability to life	1
	Personel Development	1
	Being unnecessary	1
Inferences	Positive attitude towards thinking education	7
	Acquiring critical thinking skills	6
	Acquiring creative thinking skills	3
	Awareness of what thinking is and how it happens	3
	Experiencing thinking	2
	Acquiring reflective thinking skills	1
	Transferring thinking skills to life	1

According to Table 11, it is evident that the participants evaluate the thinking education course within the logic components which are views on the purpose of thinking education, assumptions about thinking education, process and results, possible perspectives on thinking education and inferences. Views on the purpose of thinking education is defined by the themes which are awareness, skill and personal development. ''*Awareness of thinking ways*'' (f=5); ''*understanding what thinking means*'' (f=4); ''*needing to think*'' (f=3); ''*awareness of learning ability of critical thinking*'' (f=2) are the codes defined under the theme awareness. The most frequently expressed code under the theme skill is ''*gaining critical thinking skill*'' (f=13) "*Providing personal development in thinking skills*'' (f=4) as the only code under the theme personal development. The most frequently expressed codes related to assumptions about thinking education are ''*developing a positive attitude towards the course*'' (f=6); ''*learning to think*'' (f=4) and ''*acquiring thinking skills*'' (f=2). Process and results is defined by the themes which are learning and teaching process and results. ''*Question and answer*'' (f=4) and ''*brainstorming*''(f=4) are the most frequently expressed codes under the theme learning and teaching process. ''*Encouraging critical thinking*'' (f=8); ''*encouraging to question*'' (f=4) and ''*observing different perspectives*'' (f=4) are the most frequently expressed codes under the theme results. The most frequently expressed codes related to possible perspectives on thinking education are ''*being necessary*'' (f=4); ''*being useful*'' (f=4) and ''*development of thinking skills*'' (f=3). ''Positive attitude towards thinking education'' (f=7) and ''*acquiring critical thinking skills*'' (f=6) are the most frequently expressed codes related to inferences. Direct quotations from the participants on these themes and codes are given below.

''...Thinking education is a necessary and useful course...''(prospective teacher 1)

''This course has contributed to my personal development. Also, it has made me gain a different point of view.'' (prospective teacher 6)

''My purpose of taking the course is the same with the purpose of the thinking education course. The aim of the course is to raise individuals who think critically and create awareness. My aim is to gain different perspectives and develop myself intellectually.'' (prospective teacher 8)

''Thinking education leads one to think deeply and in detail. I believe in the importance of thinking education.'' (prospective teacher 9)

''Thinking education has contributed to the development of my thinking skills. It helps me to think purposefully and to make in depth analysis by questioning.'' (prospective teacher 16)

''Experiencing critical thinking constantly and making evaluations based on our experiences have contributed to our ability to gain critical thinking. I think that thinking from different perspectives broadens our horizons.'' (prospective teacher 17)

4. Conclusion and Discussion

What is concluded in the research is expressed below and the findings are discussed in the context of the literature. It can be inferred from the findings on media literacy that the prospective teachers' post-test media literacy scores have increased after thinking education. While the difference between the pre and post-test scores in such factors as having knowledge and judging and getting an implicit message is observed, the increase in their post-test scores in analyzing and giving reactions isn't meaningful. These findings indicates the efficacy on thinking education on the prospective teachers' media literacy. This indicates the success in thinking education, the goals of which are to train the prospective teachers in analyzing, interpreting and evaluating media messages and texts. The prospective teachers, having participated in thinking education are equipped with such media literacy skills. Media literate prospective teachers also think critically. Feuerstein (1999) finds out that primary school students, having trained in terms of media literacy, became capable of thinking critically on TV series and newspaper advertisements. Indah (2016) reveals the difference between trained learners on media literacy and those, lack of media literacy training in terms of the use of higher order of critical thinking. The similar inference are made by Kubey (2002) stating students will have higher order critical thinking skills such as critical interpretation, analysis and evaluation in case they have been trained on media literacy. As identified by Ruggiero (2015), the students become aware of how to apply their critical thinking skills upon watching or reading media messages and texts as a result of specific exercises. The importance of media literacy in support of critical thinking is expressed by Feuerstein (1999) in such a statement "Media literacy aims to develop metacognitive reflective strategies by means of study and critical responses towards the content of the media and its messages." Moreover, it is aimed to "develop students' habits of inquiry and skills of expression they need to be critical thinkers, effective communicators and active citizens in today's world" (Facione, 1990). Therefore, being trained in analyzing, interpreting and evaluating media messages and texts is a way for the prospective teachers to be both media literate and critical thinker.

In addition to media literacy, increase in post-test mean scores in both critical reading and critical writing has been observed. The prospective teachers, having been trained to not only read but also write media messages and texts critically, become critical literate is concluded. The basic strategies for the integration of media literacy and critical thinking into curriculum, offered by Scheibe and Rogow (2008) are implemented through thinking education. As a result, thinking education has achieved the goal of training the prospective teachers with critical literacy and media literacy skills.

From the prospective teachers' points of view, learning outcomes of thinking education are stated as realizing the bias of media messages and implicit meaning of media messages, having positive attitudes towards thinking education, judging based on facts and information, having positive attitudes towards searching for information, questioning media messages and having critical thinking skills. These findings show that the prospective teachers have gained

not only reading and writing critically but also affective features after thinking education. Because the prospective teachers are enabled to be equipped with these skills through having chance to interpret the media messages and texts in terms of the parts of thoughts such as point of view, assumption, inference, conclusion, etc. and such logic standards as clarity, accuracy, precision, etc. According to Paul and Elder (2002), a clear understanding of the parts of thinking, applying the logic standards for thinking to those parts, above all thinking with regard to these factors will improve critical thinking skills and the quality of human life will be significantly improved.

The effects of thinking education on the prospective teachers' critical literacy are expressed as questioning everytime, being a researcher, doubting the accuracy of the information, examining any text from different perspectives, using different sources of information, transferring critical thinking skills into daily life, gaining critical literacy awareness, understanding the importance of critical literacy. Moreover, thinking on media messages critically, analyzing media messages in detail and noticing the implicit media messages are the other views focusing on the positive effect of thinking education on the prospective teachers' reading media messages and text critically. In addition to its' positive effect on their critical literacy, another positive effect is stated to be on the prospective teachers' media literacy. These positive effects are explained as gaining critical thinking skills, questioning media messages, noticing the implicit media messages, examining media messages from different perspective, having awareness of being a media literate, discovering bias of media messages, reading media messages objectively, evaluating media messages using different sources of information, being a researcher, having theoretical knowledge about media messages analysis. The occurrence of the positive effects of thinking education on the prospective teachers' both critical literacy and media literacy indicates that how to think critically has been experienced in thinking education at the classroom and these experiences make them equipped with critical thinking skills. According to many researchers (Indah, 2006; Scheibe and Rogow, 2008; Worsnop, 2004) media literacy also includes critical thinking, required to be critical literate. Critical thinking is an indispensable way to critical literacy and media literacy. Therefore, it is expected that the effects of thinking education on the prospective teachers' literacies are similar in terms of critical thinking skills.

It is observed that before thinking education the prospective teachers define their critical literacy levels by using negative adjectives, pointing out their thinking action, ways of thinking and their competency in thinking critically. In general produced adjectives before thinking education symbolize the prospective teachers' incompetency in critical thinking and questioning. In contrast, at the end of the thinking education the adjectives point out the prospective teachers' awareness of how to read and write critically and their competency in critical literacy. In addition, adjectives generated to delineate the prospective teachers' media literacy before thinking education have negative meanings, including incompetency, negative attitudes and unawareness of the act of thinking. Furthermore, the adjectives produced after thinking education show that some thinking skills such as criticism, scrutiny, inference, comparison, etc. are acquired after thinking education. Moreover, adjectives emphasizing the importance of media literacy and the desire to be media literate are produced by the prospective teachers having been trained in media literacy. As opposed to the beginning of thinking education when the prospective teachers are incompetent in thinking on media messages critically, they gain media literacy skills and become aware of the ways and actions of media literacy. To sum up, it can be stated that the prospective teachers' awareness to both critical and media literacy and their competencies in these field have increased through thinking education.

The prospective teachers' mostly choice in Figure D, symbolizing the complete intersection of the prospective teachers' competencies and critical literacy indicates their high level of critical literacy after thinking education. The reasons for their high critical literacy are stated as obtaining critical literate identity, learning how to read critically, getting experience, reinforcement of information, gaining self-confidence, independence from prejudices and having a positive attitude. Similarly, that the prospective teachers have mostly chosen Figure C and D, symbolizing their high level of competency in media literacy proves the efficacy of thinking education. The reasons for their high level of competency in media literacy are stated as obtaining media literacy identity, researching for media resources, questioning media messages, gaining self-confidence, observing different perspectives, following media, having experiences in interpreting media messages, being critical, having continuous interaction with the media, discovering the bias of the media, being curious and aware of media literacy. As a result, the prospective teachers has acquired such skills as analyzing, interpreting and evaluating media messages and media texts through thinking education. Moreover, in addition to media literacy skills, they feel confidence in analyzing and criticizing media messages.

It is concluded that the prospective teachers generally find themselves competent in critical and media literacy after media message reading and evaluation activity. Following different media sources, learning how to question media messages, discovering the bias of media messages, making inferences, evaluating messages as regards logic components, being objective and curious, getting rid of prejudices, searching for facts and information are the prospective teachers' behaviors, leading to their self confidence in critical and media literacy. In addition, ad analysis activity contributes the prospective teachers' literacies. The prospective teachers are experienced in questioning, thinking critically, capturing hidden message of advertisements, reviewing ads with different perspectives, accessing information sources and analyzing ads with logic components through ad analysis activity.

The results of their evaluation of thinking education within the logic components such as views on the purpose of thinking education, assumptions about thinking education, process and results, possible perspectives on thinking education and inferences also prove the efficacy of thinking education on their critical and media literacies. From the prospective teachers' points of view, the purposes of thinking education are listed as being aware of thinking ways, understanding what thinking means, being aware of learnability of critical thinking, gaining critical thinking skills, developing personally in thinking skills. Upon reviewing their views on the purposes of thinking education, it can be concluded that thinking education has reached the goals of making the prospective teachers develop their critical thinking skills. According to the prospective teachers, assumptions about thinking education are developing a positive attitude towards thinking education, learning to think and acquiring thinking skills. This indicates the efficacy of thinking education on the prospective teachers' not only cognitive skills but also their affective features. Considering their evaluation on thinking education in terms of the process and the results, question and answer as well as brainstorming are the instructional techniques used in thinking education to analyze, interpret, criticize and evaluate media messages. When thinking education is evaluated in terms of possible perspectives, it is seen as a necessary training. Moreover, it is inferred by the prospective teachers that they have acquired critical thinking skills and a positive attitude towards thinking education.

Skolverket (2011 cited in Ekvall, 2013) lists the goals of education as equipping the students with such properties as being creative, competent and responsible and developing "their ability to examine facts and relationships critically". That is to say, Skolverket's views on the goals of education and the results of this research point out the necessity to be equiped

with media and critical literacy. Therefore, such courses dealing with media literacy education and critical literacy education can be integrated into teacher education programs independent from any subject or a discipline. Despite such an important educational goals, critical literacy is difficult to be integrated into curriculum (Kunnath and Jackson, 2019). Behrman (2006) explains the reason of the difficulty in integration as lack of instructional methods and strategies. However, Scheibe and Rogow (2008) explain basic ways to integrate media literacy and critical thinking into any curriculum. These can be exemplified as enabling students to think critically about information on media; (2) pointing out the possibility of different interpretation of media messages by people with different points of view; (3) discussing both printed and image or sound based texts on media; (4) enabling students to determine and make comment on the latent elements of media messages (5) being model as a teacher presenting how to think critically on media texts (6) developing an awareness of issues of credibility and perspective, comparing the ways different media present information about a topic, etc. In similar, media literacy and critical literacy can be integrated into a curriculum in teacher education in such a way that the prospective teachers have a chance to practice thinking critically on media messages, interpreting the latent elements of media messages, following the process of thinking critically, modelled by their teachers and searching for information on the topic of media texts, questioning media messages by regarding such standards as clarity, accuracy, precision, relevance, depth, logic, breadth, significance, fairness, comparing the ways different media present information about a topic, discussing the different points of view of various media texts, analyzing media content in terms of misleading information on media texts. Therefore, it can be concluded that integration of media literacy and critical literacy into any curriculum can take place regarding the instructional points stated above. Moreover, Equipped the students with these cognitive skills has become the educational goals from primary education to higher education. Therefore, thinking education or others, named differently but having the goals of training critical and media literate individuals, have become indispensable for all of us and should be integrated into teacher education programs as a separate lesson. Moreover, critical thinking skills, necessary for individuals not only for their daily life but also their working place should be learning outcomes of all lessons in teacher education programs. Subject or discipline specific content should be studied with critical thinking activities simultaneously for each lesson.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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PERSPECTIVES OF TEACHER CANDIDATES REGARDING THE IMPACT OF THE MEDIA ON VALUES

Research article

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PERSPECTIVES OF TEACHER CANDIDATES REGARDING THE IMPACT OF THE MEDIA ON VALUES

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Abstract

The research aims to determine the opinions of teacher candidates regarding the media's influence on values education. The research was carried out within the structure of a case study which is one of the qualitative research methods. The research study group is composed of 64 teacher candidates studying at the Faculty of Education at Atatürk University, Primary Education Department, Classroom Education Branch. A descriptive analysis technique was used to analyze the data. As a result of interviews with the teacher candidates, it was concluded that the media has a negative and positive impact on values and it is essential to have value-oriented programs, media surveillance, representing a model, and introducing our regions when providing values education through the media. Television and the internet are the most effective media tools to express values and it is crucial to raise awareness and being selective for media to have a positive effect on value achievement. The recommendations for media strategies in value transfer may be realized by raising awareness, paying attention to the social structure, being impartial, applying surveillance, having shows for children, and adapting to the change.

Keywords: media, value, values education, teacher candidate

1. Introduction

The stage in technology that mankind has achieved is gaining speed day by day. Technology affects not just the everyday lives of individuals but also the social life. Today, media tools, which are a technological product, have gained variety. This variety has enabled media instruments the power to affect the behavior and attitudes of people in various ways.

Nowadays, people spend a lot of time with these media tools. Therefore, media tools inevitably affect people's behavior in the short or long term whether positively or negatively. Without a question, the values are one of the driving and determinant factors in the behavior and attitudes of individuals. Values can be defined as abstract concepts that reflect an individual's beliefs and principles about life which occur with the interaction of the individual's life, the culture of the society and the structure of the social environment, the priority of which can vary from person to person and which can only be attributed when displayed by behaviour (Yıldırım, 2019, 11). Values affect individuals' daily behaviors and

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their attitudes towards other people (Schwartz, 2012). Value is the meaning that we attribute to the role and position of a specific item among the same sort of items. Therefore, something really valuable to us may not mean much to someone else (Ekşi & Katılmış, 2016, 9).

In the globalizing world, value judgments are also shifting in comparison with the past (Türk & Nalçacı, 2011), especially in the twenty-first century, which is the age of technology, its effect is felt. Today, with technological growth, the media is in a role that can penetrate every segment of society in different ways, affect and lead the majority of society through conveying messages (Gömleksiz & Duman, 2013). Currently, human beings live depending on media, and a life without media seems impossible (Şahin, 2014). On the other hand, young people who are affected by the media and the digital environment's popular culture face the threat of value degeneration and exhibiting negative behaviors (Aydın & Akyol-Gürler, 2012, 17).

Without a doubt, media offers undeniable great opportunities for the development of societies. In particular, it has vital roles to perform when transferring values and traditions to younger generations. However, it should not be overlooked that the media should be formed healthily and ensure an effective value transfer (Turan & Nazıroğlu, 2016, 160). Education of values has become an imminent necessity to raise individuals who think healthily, peaceful, and live harmoniously in society. A healthy world can exist when people have a healthy mood and behavior (Çepni, Kılınç, & Palaz, 2019, 610).

When literature on the usage of university students ' social media examined, there are many experiments carried out with various variables regarding the relationship between Twitter use and student achievement (Knight & Kaye, 2016), the correlation between Facebook use and student learning (Kolek & Saunders, 2008), the relationship between Facebook use and student achievement (Michikyan, Subrahmanyam, & Dennis, 2015; Pasek, More & Hargittai, 2009), student engagement with the use of Twitter (Junco, Heiberger & Loken, 2011), the effect of social media on cooperative learning (Bozanta & Mardıkyan, 2017) and with media literacy and values education. However, research related to media impact on values may be seen to be limited. From this point of view, the aim was to determine the teacher candidates' opinions on the effect of media on values. For this purpose, answers to the following questions were sought: Of the media;

1. What are the effects of media on values?
2. How can values education be given through the media?
3. Which media tools work most effectively for expressing values?
4. What can be done for the media to have a positive effect on gaining values?
5. What can the media include in its practices to can transfer values?

2. Method

2.1. Research Model

The case study, one of the qualitative research methods, has been utilized in this study which aimed to evaluate the impact of media on values. The most fundamental aspect of the qualitative case study is to examine one or more cases in-depth. The variables related to a case are examined in a holistic manner and emphasis is directed on how these variables impact the case concerned and how they are affected by the particular case (Yıldırım & Şimşek, 2011).

2.2. Study Group

The research study group is composed of 64 students studying in the academic year 2017-2018 at the Atatürk University Kazım Karabekir Faculty of Education, Department of Classroom Education, determined by criterion sampling method among the purposeful sampling methods. In the study, the key criterion was that the teacher candidates should study classroom education majors and they participate in the interviews voluntarily. Information regarding the study group of the research is provided in Table 1.

Table 1. *Distribution of the demographic characteristics of the study group*

Options		1	2	3	4	Total
		Male	Female	-	-	-
Gender	n	20	44			64
	%	31,25	68,75			100
		1st Grade	2nd Grade	3rd Grade	4th Grade	-
Grade	n	13	15	20	16	64
	%	20,3	23,4	31,2	25,0	100

2.3. Data Gathering Tools

Data collection was carried out by using a semi-structured interview form consisting of five open-ended questions which are prepared by the researchers. The interview form was revised in line with the opinions and suggestions of the field experts.

2.4. Data Analysis

A descriptive analysis technique was used to analyze the data. The data obtained in the descriptive analysis are summarized and interpreted according to the previously determined themes. The data are described by this method and then, interpreted (Yıldırım & Şimşek, 2011). Interviews with teacher candidates were coded as "1-4M, 4-3F". 1 refers to interviewing order, 1/2/3/4 refers to their class, M/F to gender.

3. Results

This section includes results obtained from the answers of the teacher candidates to the interview questions and their comments. Results about the teacher candidates' opinions concerning the effect of media on values are stated in Table 2.

Table 2. *The results regarding the effect of media on values*

	f
Negative	33
Positive / Negative	31

When the table is examined, the effect of the media on the values appears to be negative, and both positive and negative respectively. Participant opinions on the negative effect of media on values are set out below:

"Media impact on values is completely negative. "Because it is obvious that values are internalized and valued more back in the era where the media is absent" (1-1F),

"Most of the broadcasts adversely affect our values. Clothing, style of speech, behavior, etc. We all become insensitive and accept the condition since we are exposed to every day. They substitute the values that we have previously as time passes and that is how we begin to live in this way. " (25-2M),

"I believe that foreign TV series are contrary to Turkish customs and traditions. The adverse representations created by admiration to the actors who play in those TV series harm our values. " (33-3F),

"The media harms individuals' personality and morality with dangerous and pointed arrows... Media deceptions adversely impact people and particularly children." (42-3F),

"*I truly think that there's no such thing as personal life due to the media. Individuals reflect all of their problems through the media to our society without differentiating the children or adults. Such shows mislead a significant portion of our community, and cause them to diverge from our values."(63-3M).*

Positive/negative opinions stated by the participants are as follows:

"The values are held intact as long as the media does not interfere with private life so that it becomes a useful medium. But if the principle of the right to privacy is not protected, it will be a violation of rights and causing damage. " (2-2M),

"... It is positive if it reflects our cultural values and enables them to be passed on to younger generations, and it turns out negative if it imposes other cultures on us... (4-1M),

"The media teaches our many values which have been almost discarded. Violation of the right to privacy can be considered as its negative aspect. " (9-1F),

"*I think the media similar to a double-edged knife. It whether makes or breaks the deal" (19-4F),*

"*The media will affect the public in any manner desired. It can manipulate things in such a fascinating way that it can render what's right is wrong, what's wrong is right".(58-3F).*

The results obtained regarding providing the values education through media are demonstrated in Table 3.

Table 3. *Results regarding the values education providing through the media*

	f
Values-oriented program	25
Being impartial	10
Surveillance	9
Being a model	6
Introducing our regions	5
Prioritizing values	4
Public service ads	3
TV series	2

While evaluating the table, among the opinions regarding the execution of value education through the media, the statements with the highest frequency are values-oriented programs, being impartial, surveillance, and being a model respectively.

When examining the opinions on producing value education via the media, it has been ascertained that the highest frequency is the values-oriented program. These opinions are

"People who know about values, about our society, our tradition, and our customs should design these programs. All these people know the values well and also they reflect them well." (4-1M),

"The most effective method is to create cartoons, movies, TV series, etc. as broadcasts." (25-2M),

"It is easier to engrain in values from childhood. Thus shows that represent values that draw children's interest can be created." (52-2M).

Opinions regarding being impartial for providing value education via the media:

"If they could explain the actual state of society there would be a better value education. The society should be reflected as it is, without any exaggeration." (7-4M),

"Effective values education through media is only feasible by an objective and fair usage of the media." (12-1F),

"All cultures should be taken into consideration, neither one of them should be superior nor another one perceived as inferior." (63-3M) and opinions regarding the surveillance over the delivery of value education through the media are:

"Any form of media program which is morally acceptable should not be permitted to broadcast." (23-1F),

"Family and family life-related issues can be taught especially to the children through the media. For this purpose, TV series or programs should be refined"(31-3F),

"First of all, apart from what is conveyed in the media outlets, its impact on moral development should be taken into account. Since every word articulated and every behavior exhibited leaves a mark on human memory, therefore, everything needs to be realized with considerable caution." (42-2M).

Opinions on being a model for providing media value education that attracted attention among the teacher candidates' views are:

"The figures the children, teenagers, and parents admire and consider as icons should be represented as characters who act based on moral rules" (13-1F),

"One example can be the families and societies in which respect, love, and tolerance are effectively utilized can be represented through the media." (34-2F).

Results of the study on the opinions of the teacher candidates regarding the media tool which is the most influential to communicate values are presented in Table 4.

Table 4. *Results regarding media tools that are most influential for communication of values*

	f
TV	44
Internet	12
Internet and TV	6
TV and Newspaper	2

The highest frequency of media tools that are effective in communicating the values can be stated as television, internet, and internet-television when examining the abovementioned table. When analyzing the views of the teachers about the practices which are effective in gaining value, it was decided that television was the highest frequency.

"Television is seen everywhere and watched by everyone." (4-1M),

"The first thing to do when a family is together is watching TV. ... And they mirror what they see on TV to their lives. " (6-4M),
"Television appeals to both the eyes and the ears. It affects our emotions tremendously. " (56-3F),

Opinions related to the statement about the most effective media tool in providing value education through the media is the internet:

"Internet is the top-rated option for people to spend their free time." (15-4M),
"It is a media instrument which affects even a child who under the school age. It is now a tool that affects everyone whether they are young or old. " (29-1M),
"The internet has a rather wide and extensive network of information. This function can make it effective in the transfer of values. " (32-2M).

Results of the study on the teacher candidates' opinions about the media's positive effect on value creation are presented in Table 5.

Table 5. *The results regarding the positive effects of the media on value gain*

	f
Raising Awareness	43
Being selective	21

Raising awareness and being selective have been determined as the opinions of the teacher candidates for the media to have a positive effect on value gain.

The teacher candidates drew attention to the idea that raising awareness would be successful in value gain considering the positive effect of media. Statements about the teacher candidates' views in this context are set out below:

"Value-oriented practices should be arranged and individuals should be attracted to this topic." (30-2F),
"Public awareness should be raised with proper programs addressing values" (33-3F),
"At least one value should be declared each month and individuals should become aware of it. Programs, shows, interviews, and discussions should be organized to generate values for society. " (36-2F),

The teacher candidates' views on being selective regarding the positive effect of media for creating value are can be expressed as:

"Every TV show or series should not be watched. TV series that influence people negatively should be banned. " (7-4M),
"Shows provided to people by the media should be carefully selected so that they can positively influence the values" (16-2F),
"Media should review everything broadcasted to have a positive impact. Because we see that there are such unnecessary shows that disregard values ..." (23-1F).

The results of the study on the views of the teacher candidates regarding media practices of conveying values are summarized in Table 6.

Table 6. *Research results on suggestions for media practices concerning the conveying of values*

	f
Raising Awareness	21
Paying attention to the structure of society	17
Being impartial	9
There must be surveillance	7
Children's programs	5
Adaptation to changes	3
Media professionals should be educated about values	2

When the table is examined, the opinions with the highest frequency related to the suggestions for the practices of the media to convey the values can be respectively stated as raising awareness, paying attention to the structure of the society, and being impartial.

The frequency of raising awareness is the highest among the teacher candidates' suggestions considering the practices of the media to transfer values.

"...Publications that will raise awareness for values taking children and adults into consideration " (35-2M),
"...awareness should be raised and people should be more sensitive" (42-2M).

Among the suggestions, opinions about paying attention to the structure of society are expressed below:

"Programs should be crated while paying attention to the culture and values" (30-2F),
"...broadcasts that damage values should not be included" (31-3F),
"... I would like to see media tools that present images, music, and videos that abuse society's values are banned" (50-3F).

Among the suggestions, opinions regarding the creation of children's programs as follows:

"Especially children's achievements of values are critical. Therefore, children's shows should be created as values-oriented "(16-2F),
"In particular, the importance should be given to broadcasts for children. Since they take whatever we expose them and live in that way in the future "(25-2M).

Opinions on adaptation to change among the suggestions stated as:

"When conveying values, a determination is required. The continuous update should be provided in this regard. "(33-3F),
"I believe that if we act based on the needs of the developing and changing world, we will achieve goals and objectives" (64-4M).

The suggestions regarding the issue of education of media professionals about values are;

"*Individuals that work in the media should be expert or educated in values and education and should create shows in this regard. (58-3F).*

4. Conclusion, Discussion and Suggestion

It was ascertained media's effects within the scope of this research on values are negative and positive/negative. In research conducted by Ayaydın and Yıldız-Ayaydın (2018), the

result stating that media has positive and negative effects in secondary school students' value creation process supports the current research result. Researchers believe the social media has detrimental implications on learning (Greenhow & Lewin, 2016). In their experimental study, Kirschner and Karpinski (2010) reported that the use of Facebook tends to decrease the academic success of university students at the end of the term. In their research, Akdemir, Aşıkcan, and Saban (2016) clarified that social media is causing the erosion of values such as respect, love, tolerance, and fairness through the concept of loss of value. According to Karaduman, Köse, and Eryılmaz (2017) the values that individuals neglect while engaging social media as "respect", "right to privacy", "impartiality", "patience" and "ethical values", as a result of their research with conducted teacher candidates. The research carried out similarly reveals that different social media platforms ignore privacy and confidentiality, cause loss of feeling of embarrassment and intensify the feeling of jealousy (Yıldız, 2012). On the contrary, O'Keeffe and Clarke-Pearson (2011) identified that social media helps children to socialize and improve their communication skills. In their research of university students, on the other hand, Junco, Heiberger, and Loken (2011) found that Twitter, a social media platform, improved both student engagement and academic performance at the end of the term.

Considering the providing values education through media, it has been concluded that the values-oriented programs, being impartial, surveillance, being a model, introduction of our regions, prioritizing values, public service ads, and TV series should be included. Taking advantage of the influencing aspect of visual media on individuals, it can be assured that programs and shows that promote values education should be provided with higher priority. (Türk & Nalçacı, 2011). Being a model is very effective in gaining values. Balcı and Yanpar-Yelken (2013) and Yıldırım, Becerikli, and Demirel (2017) concluded that one of the approaches they consider most effective in values education is being a role model.

Media tools that are effective in conveying the values are concluded as television and the internet respectively. When people arrive at their homes, generally the first thing they do is turn on the TV or computer and become direct receivers. With television, the hierarchy of information has collapsed profoundly. Lifestyles depicted in ads and TV shows have influenced us and we have diverged from existing norms and values of our culture. (Hökelekli, 2013, 165). As a product of technology, the usage of the internet and social media continues to be present in every medium at an incredible speed (Jiao, Jo & Sarigöllü, 2017). While internet usage in the United States in 2012 was 81% (Chandran, 2016), 67% of the population are Internet users in Turkey in 2018 (Arslan, 2019). It can be said that the Internet and social media use is high in Turkey (Şahin and Yağcı, 2017). As a need for modern life, individuals create new relations with the assistance of new channels of communication that can be accessed via the Internet (Sağlam, 2017, 56). While this media tool provides many resources for adolescent development if the internet is accessed purposefully, however, it may bring several threats to adolescent life in the event of misconduct (Kalkan & Kaygusuz, 2013, 87).

Another significant result of the research is that the media has a beneficial effect on value gain and that the suggestion that has the highest frequency is raising awareness. By influencing people's views of value, media affect their mental status and trigger values to weaken in society (Yazıcı, 2016, 144). Although we are exposed to a stream of information by the mass media, we are not even aware of the majority of the messages that were implied. Since several of these messages have not projected upon us under our strategy, we have no strong control over them (Şahin, 2014, 51). Regaining this control can be accomplished by increasing people's consciousness about the key features of media tools.

Suggestions for media practices to convey values in the study have reached a conclusion that includes paying attention to society's structure, being impartial, the need for surveillance,

creating children's programs/shows, adapting to change, and providing education to media professionals about values. The audience/reader establishes certain patterns of "behavior" after embracing or internalizing explicit or implied messages delivered via the media. This influence becomes apparent in several ways such as mimicking the violent scenes, developing new consumption habits, following fashion trends, taking the role models as examples who are presented on the screen (Şahin, 2014, 55). If the child develops fundamental skills, social values, behavioral habits, or comprehends the difference between good and bad, right and wrong, not from the home, but television and social media (Genç, 2016), in this case, it will require the media to pay attention to the social structure, surveillance, creating value-oriented programs for children to acquire value and facilitation of the media professionals to become more conscious about values. The media has a great influence on individuals and societies. This has therefore made it necessary to establish the regulatory structures for this system which has a tremendous influence and to enable it to carry out its activities within the framework of those rules. Surveillance is sought, sometimes by specifically enacting legislation and sometimes by exercising the jurisdiction of certain rules to which it relates (Yazıcı, 2016, 173).

The variety of media tools in today's society has enabled the media's current effect on people and communities to become much greater. Taking the requisite steps for the media to favorably impact individuals applies to all people residing around the world. Currently, many values have gained universal quality. For a livable world now, it is a necessity to enable individuals to gain universal values through media.

5. Conflict of Interest

The authors declare that there is no conflict of interest.

6. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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THE EFFECT OF USING CREATIVE DRAMA METHOD ON STUDENT ACHIEVEMENT IN THE SOCIAL STUDIES COURSE: A META-ANALYSIS STUDY

Review study

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THE EFFECT OF USING CREATIVE DRAMA METHOD ON STUDENT ACHIEVEMENT IN THE SOCIAL STUDIES COURSE: A META-ANALYSIS STUDY

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Abstract

The aim of this study was to determine the effect of creative drama method on the Social Studies course achievement of students. Within the scope of the research, in Google Academic, EBSCOhost, ERIC, ULAKBİM TR Index, thesis databases of the Higher Education Council in Turkey (YÖK), a search was conducted via the key words "drama, creative drama, role-playing, improvisation, Social Studies lesson, and academic achievement". As a result of these searches, a total of 19 studies (4 articles and 15 theses) published between the years of 2006 and 2020 were reached. The effect sizes, heterogeneities and publication bias analyzes of the studies were conducted using the "Comprehensive Meta-Analysis" statistical program. It was found that the studies conducted on the creative drama (Q=90,019 p <0,05; I^2= 78,893) method showed a heterogeneous distribution, and there was no publication bias. According to the results of the study, the creative drama method had a very large effect size (d = 1,17061) on the success of the social studies course in favour of the experimental groups which utilized the creative drama method. Regarding the effect size results in terms of the years, type and class level of the studies, the effect size of the studies published between 2006-2012 (d=1,208) was higher and was largely positive. Studies published as articles had higher effect size than the theses, and the effect size was perfectly positive. When the effect size of the sample group was examined in terms of the grade levels, it was concluded that the class with the huge effect size was 8th grade (d = 2.733) and the class with the lowest effect size was 4th grade (d = 0.709).

Keywords: Social Studies course, student achievement, creative drama, meta-analysis .

1. Introduction

The use of different teaching methods and techniques is seen as a necessity of the modern age to make education effective, efficient and attractive (Avci, Coklar, & Istanbullu, 2019; Yucer, 2011). Making an effort to improve themselves in a versatile way in contemporary societies, individuals try to keep up with the change in the environment where they live (Kartal, 2009; Yilmaz, 2013). This change shows itself in the direction from the teacher-centred education system towards constructive and creative educational approaches that make the student active in the learning process (Kaf, 2000; Kara & Cam, 2007; Yılmaz, 2013). Various methods such as question and answer, discussion (debate, panel, counter-panel, forum, etc.), trip-observation, brainstorming, problem-solving, a drama that will make students active are used in this system that puts the student at the centre (Aylar & Aksin, 2011; Çelikkaya & Kus, 2009; Ilter, 2018; Yazicioglu & Alkan, 2019). The creative drama method, one of the methods that make the individual active, is one of the areas and methods that have been popular in recent years (Ulutas, 2011). There are many definitions in the literature regarding the concept of creative drama (And, 1974; Gonen & Dalkilic, 2002; Heatcote, Dorothy & Herbert, 1985; Lehman, 1986). According to San (1998), this concept, which does not have a fully Turkish equivalent, is derived from the Greek word '*dran'* and means to do, to make and to operate.

Creative drama is named sometimes as method and sometimes as a discipline and field with names such as 'dramatization in education, dramatization, role-playing, dramatization, pedagogical play' (Adiguzel, 2006). It is possible to find different uses related to Creative Drama called Creative Drama in the United States of America, Drama in Education in England, and in Germany, School Game, Play and Interaction (Tuluk, 2004). Although the creative drama has different names in the literature, these concepts are not different from each other in terms of purpose, scope and quality (Adiguzel, 2006; Akoguz, 2002). However, the phenomenon of creative drama should not be perceived as staging a play or theatre play. Because in creative drama, volunteerism is essential, there is sharing and togetherness in its essence, it is not based on a written text and is not staged (Adiguzel, 2002; Aksari, 2005; Akyel & Caliskan, 2013; San, 1998). Yalcin and Aytas (2012) express the concept of creative drama as a teaching method within the education program and the improvement of the individual's own skills. Especially when the concept of creative drama is considered in two dimensions, its most important function is its use in the educational environment and its contribution to education. Creative drama is a teaching method and a form of self-expression, and it is an important option for today's educational approaches with its individual-centred structure (Ustundag, 1998; Yenilmez & Uygan, 2010). Creative drama activates students' cognitive, affective and psychomotor learning areas, and provides them with a rich learning space (Onder, 2002). Allowing students to interact more with the environment, the creative drama method has a structure that can be integrated with the modern education system. In Turkey, creative drama supports students' creativity, aesthetic development, collaboration habits, language and communication skills, problem-solving skills, sociability and their development in many more ways (Ustundag, 1998; Yegen, 2003). Also, individuals who receive creative drama education have distinct priorities in coping with problems and adapting to new situations (Adiguzel, 2015). Because of these priorities and advantages, creative drama activities are used by many disciplines today. In the related literature, it is seen that creative drama method is applied in the teaching of disciplines such as Art Education, Turkish Teaching, Foreign Language Teaching, Social Studies Teaching, Life Sciences Teaching, Science and Mathematics Teaching (Akgul & Tanriseven, 2019; Aykac, 2007; Keles & Cepni, 2019; Kirmizi, 2009; Maden & Dinc, 2017; Soyer, 2016; Utkur & Acikalin, 2018). As in other lessons, the creative drama method is frequently used in the Social Studies course teaching process to achieve the goals of the lesson (Ali, 2019). The Social Studies course prepares individuals for the natural and social environment by contributing to their adaptation to the environment they live in (Ozturk & Dilek, 2002). When the Social Studies course curriculum is examined, it is thought that creative drama will affect the achievements of many units. Because in the learning of this lesson, which takes its subject from life, participating in the learning environment, learning by living and interacting are essential (Caliskan & Karadag, 2008; Ozturk & Sari, 2018). Besides, since the Social Studies course includes many historical, political and cultural subjects and it is an interdisciplinary course, its usage area is wide (Ustundag, 2009). In Social Studies and Life Sciences lessons, where abstract concepts are intense, it is possible to concretize, interpret and revive the subject with creative drama method, and it provides positive benefits to students (Caliskan & Karadag, 2008). The positive effect of using the creative drama method in the Social Studies course on the academic success of the students was previously revealed by various researchers (Akkaya, 2020; Ali, 2019; Altikulac & Akhan, 2010; Aykac, 2008; Aysal, 2012; Bingol, 2015; Dogan, 2016; Evin-Gencel, 2009; Gundogdu, 2010; Gunaydin, 2008; Kaf & Yilmaz, 2017; Karatas, 2011; Kartal, 2009; Malbelegi, 2011; Nayci & Adiguzel, 2017; Salur, 2009; Sarac, 2015; Ulubey, 2015; Yilmaz, 2013; Zayimoglu, 2006). Various studies are showing that creative drama method positively affects course success in different disciplines in the related literature (Aydeniz, 2012; Debreli, 2011; Durusoy, 2012; Kadan, 2013; Karacil, 2009; Karapinarli, 2007; Selmanoglu, 2009; Sahin, 2012; Turkel, 2011). It has been observed

that studies that are independent from each other and that yield different results have been numerous in recent years as the aforementioned experimental studies are examined. However, it is a fact that inclusive and reliable studies are needed to make inferences by interpreting the knowledge accumulated by similar studies on the same subject (Akgoz, Ercan, & Kan, 2004). When the related literature was examined, it was seen that few meta-analysis studies were synthesizing different studies (Akdemir & Karakus, 2016; Batdi & Batdi, 2015; Ozbey, Sarikaya & Ozet, 2017; Ulubey & Toraman, 2015). Depending on increasing the use of creative drama in Turkey in recent years, it has become an indispensable element of education and has been an inspiration to many studies (Akdemir & Karakus, 2016). However, it was observed that the meta-analysis studies conducted were generally examined without being divided into separate disciplines. As a separate discipline, Simsek and Karatas (2020) examined the effect of creative drama method on success in Science Education. Although there are studies examining the effect of creative drama on academic achievement, and reaching different results, and meta-analysis studies that combine these results, no meta-analysis study related to Social Studies course was found. Therefore, it is thought that there is a need for a meta-analysis study that deals with the effect of creative drama method on the academic success of the Social Studies course. In this sense, "What is the effect of creative drama method on Social Studies course achievement?" was determined as the problem statement of the study. The sub-problems are as follows:

• What is the distribution of studies included in meta-analysis according to descriptive variables?

• How is the distribution of the effect size of the creative drama method according to years, the type of study and the grade level of the sample group?

2. Method

2.1. Design of the Study

Meta-analysis method was used in this study in which the effect of drama and creative drama methods on students' Social Studies course success was tried to be determined. Meta-analysis is defined as the statistical reinterpretation by bringing together the findings of quantitative studies conducted independently from each other on the same subject (Dincer, 2014; Ellis, 2012). It is seen that the use of meta-analysis method has become widespread in recent years. Because a method such as a meta-analysis is needed to determine whether the effects of variables measured in the experiments of the researchers' studies will be repeated or not (Radin, 2002).

2.2. Data Collection

The data to be used in the research were reached in June 2020. To reach the studies to be included in the research, the search was made using the words "drama, creative drama, role-playing, improvisation, Social Studies lesson, academic achievement, creative drama, role-playing, improvisation, Social Studies lesson, academic achievement" in Google Scholar, EBSCOhost, ERIC, ULAKBİM TR Index, YÖK Thesis databases. As a result, A total of 27 studies were reached using the creative drama method. 8 studies, which were obtained as a result of the searches to determine the studies, were excluded. 3 articles were produced from the thesis and 5 studies were not included in the meta-analysis because they did not contain the data required to calculate the effect size.

The criteria used to determine the studies included in the study are as follows:

• Research should consist of articles, master's and doctoral theses written in Turkish or English,

- • Research should be conducted in Turkey,

- • The sample sizes of the groups to be studied should be included,

- • Measurement tools used in the study should have validity and reliability information,

- • Studies should have experimental and control groups,

- • To calculate the effect size, studies should include mean, standard deviation and t-test values.

As a result, in compliance with the criteria listed above, 19 studies were included in the meta-analysis.

2.3. Coding of the Data

The coding method was used to classify the studies included in the meta-analysis and to generate data. In the coding form, there were the name of the study, the author of the study, the year the study was published, the type of the study, the sample size (Experimental, Control), The quantitative data required to calculate the effect size ((r, t, F statistics), mean and standard deviation values and p-value). While coding, Microsoft Excel 2010 program was used. After the coding, it was transferred to the Comprehensive Meta Analysis (CMA) program. The coding process was done by two independent coders and the reliability analysis was found to be 0.94 using the Cohen Kappa coefficient (Cohen's κ). While interpreting the Kappa coefficient, according to Landis and Koch (1977), the following criteria are taken as a basis. These are κ=0,81-1,00 (almost perfect), κ=0,61-0,80 (substantial), κ=0,41-0,60 (moderate), κ=0,21-0,40 (fair), κ=0,00-0,20 (slight), κ < 0,00 (poor). Accordingly, it can be said that the reliability level (= 0,94) was almost perfect.

2.4. Analysis of the Data

The data were analyzed in two different ways: descriptive statistics (frequency-percentage) and meta-analysis. In the descriptive analysis, the data in the study were classified according to various variables and presented in a table. While using the meta-analysis method, the effect sizes of the studies were found by the heterogeneity test. Cumming (2012) proposes the random-effects model for studies in the field of social sciences. The heterogeneity of the effect sizes was decided by the Q and I^2 statistics in the study where the calculations were made with fixed and random effects models. Three methods were used to test publication bias: Funnel plot, Orwin Safe N Number, Duval and Tweedie's trim and fill method. The effect size of each study included in the meta-analysis was calculated using the Comprehensive Meta Analysis (CMA) program. Hedges' g coefficient was used to calculate the effect size. In the analyzes, the confidence level regarding the effect size was determined as 95%. In calculating the effect sizes, Thalheimer and Cook's (2002) classification was used. According to this;,

- • $-0.15 \leq$ effect size< 0.15 negligible,

- • $0.15 \leq$ effect size < 0.40 small,

- • $0.40 \leq$ effect size < 0.75 medium,

- • $0.75 \leq$ effect size < 1.10 large,

- • $1.10 \leq$ effect size < 1.45 very large,

- • $1.45 \leq$ effect size, huge levels,

Positive effect size indicates that the study is in favour of the experimental group, and a negative one indicates that it is in favour of the control group (Wolf, 1988).

3. Findings

In the research, descriptive data belonging to the studies included in the meta-analysis were included.

Table 1. *Descriptive statistics on the researches involving the effects of drama and creative drama methods on social studies course achievement*

Drama Method		f	%
	2006	1	5,26
	2008	2	10,53
Year of the Study	2009	3	15,79
	2010	2	10,53
	2011	2	10,53
	2013	1	5,26
	2015	3	15,79
	2017	2	10,53
	2019	2	10,53
	2020	1	5,26
Type of the Study		f	%
	Article	4	21,05
	Thesis	15	78,95
Grade Level of the Sample Group		f	%
	4th Grade	5	23,81
	5th Grade	4	19,05
	6th Grade	5	23,81
	7th Grade	5	23,81
	8th Grade	2	9,52

When Table 1 was examined, it was seen that 15 (78,95%) of the studies conducted with the creative drama method were theses and 4 (21,05%) were articles. Examining the distribution of the studies by years, it was seen that three theses were written in 2009 and 2015 (15,79%), and no studies were conducted in experimental design and measuring academic achievement in 2007, 2012, 2016 and 2018. When the grade level of the sample group was examined, it was determined that there were 4 (19,05%) studies at the 5th-grade level, 5 (23.81%) at the 4th, 6th and 7th grade, and 2 (9,52) at the 8th-grade level. Although there were 19 studies conducted with the creative drama method, when the class level was examined, it was seen that the total number of the study was 21 because the sample group of two study was at both 4th and 5th-grade levels.

3.1.1. Publication bias of studies conducted with creative drama method

In the research, before starting the meta-analysis, it was checked whether there was publication bias. According to Kış (2013), it is important to check publication bias before conducting meta-analysis. In studies in which the meta-analysis method is used, the inclusion of only studies containing significant results into the analysis affects the process negatively (Long, 2001). Therefore, publication bias of the research was tested using Funnel plot, Orwin Safe N-Number, and Duval and Tweedie's trim-fill method. In order to decide that there is no publication bias in the meta-analysis, the effect size of the studies should be distributed symmetrically within the funnel lines (Dincer, 2014). In addition, it is expected that the standard error value will be scattered more densely towards the upper part of the graph, that is, towards zero. Funnel scatter plot results regarding the publication bias are given in Figure 1.
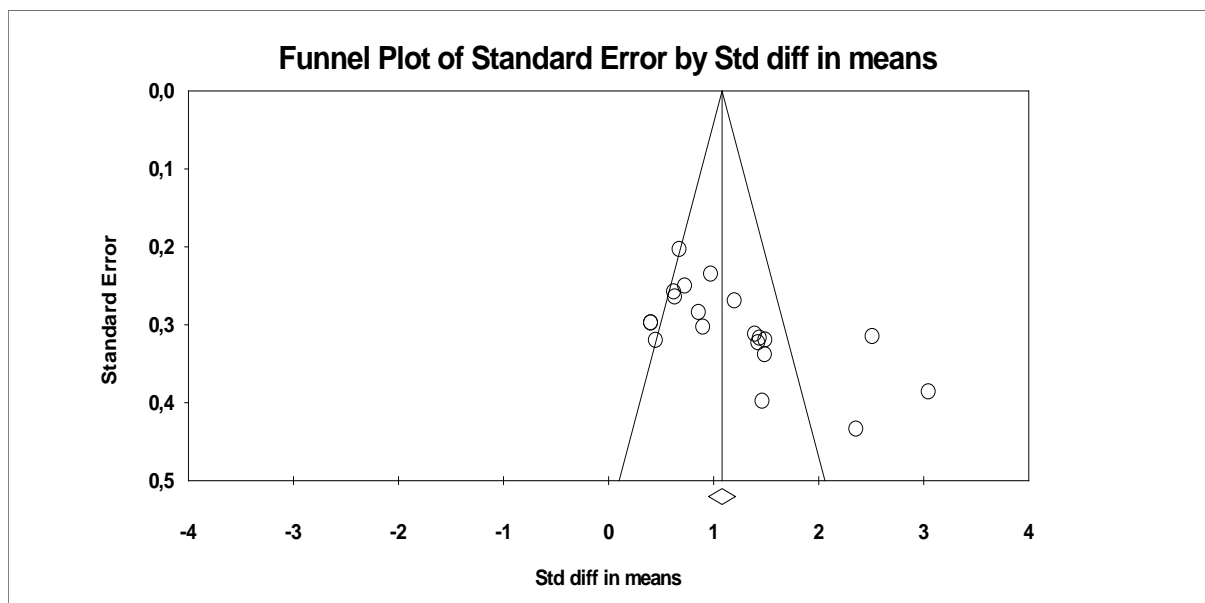

Figure 1. Funnel scatter plot of studies examining the effect of drama method on social studies course achievement

As Figure 1 shows, it was found that the studies included in the meta-analysis showed a symmetrical distribution, but there was a concentration mostly in the middle part. Although this result showed that there was no publication bias, it revealed the necessity of examining other analyzes. The analysis results are given in Table 2.

Table 2. *Statistical analysis regarding publication bias*

| Orwin's fail safe N	Number of studies required for 0.01, (N = 19) reliability level= 1535	
Trim and fill method by Duval and Tweedie	Observed Effect Size	Adjusted Effect Size
	1,17061	1,17061

Table 2 shows the results of the analysis regarding the publication bias of the studies examining the effect of the creative drama method on Social Studies course achievement. The Orwin Safe N number is used to determine the number of studies that may be lacking in the analysis of studies conducted with the meta-analysis method (Borenstein, Hedges, Higgins, &

Rothstein, 2013). The general effect size obtained from this test (d = 1.18849) at the level of 0.01, namely, the number of studies required to reach almost zero level is 1535. It is generally recommended that the number obtained should be at least 5-10 times the number of studies included in the study (Avcı, Coklar, & Istanbullu, 2019). However, this result (1535/20 = 76.75) is far above the recommended criterion. It can be said that the study does not have publication bias, since it seems impossible to reach 1535 studies. According to the results of the analysis performed with the Duval and Tweedie trim-fill method, the absence of difference between observed and corrected effect size values is another indicator that there is no publication bias. After examining the results of publication bias of the studies included in the meta-analysis, the effect size value, heterogeneous distribution value and confidence interval value of the studies were examined. The results obtained are as in Table 3.

Table 3. *Average effect sizes and confidence interval values in terms of the effect model*

Model	n	Average Effect Size	Z	Standard Error	95% Confidence Interval		sd	Q	p	I^2
					Lower Limit	Upper Limit				
Fixed Effects Model	19	1,065	16,50	0,065	0,939	1,192				
Random Effects Model	19	1,171	8,227	0,142	0,892	1,449	18	90,019	0,000	78,893

In this study in which the random-effects model was used, the average effect size value was calculated as 1.171, standard error as 0.142, the lower limit of the confidence interval of the average effect size as 0.892 and the upper limit as 1.449. In terms of the results of the homogeneity test conducted to determine whether there was a significant difference between effect sizes, it was determined that there is a statistically significant difference between the groups formed according to the experimental and control groups (Q = 90.019, p <.05). In other words, it was determined that the effect size distribution had a heterogeneous structure. The value of I^2 shows the ratio of the total variance for the effect size. Unlike the Q statistic, the $I2$ statistic is not affected by the number of studies. In the interpretation of I^2, 25% indicates low heterogeneity, 50% moderate heterogeneity and 75% high heterogeneity (Cooper, Hedges, & Valentine, 2009). In terms of the random effect model, I^2 value for 1,171 effect size value indicates a high level of heterogeneity with 78,893%. According to Thalheimer and Cook (2002), it can be said that the drama method has a wide effect on increasing social studies course achievement. The positive average effect size value (+1,171) indicates that the applied method causes a change in favour of the experimental group. The forest plot showing the distribution of the effect size values of the studies in terms of the random-effects model is given in Figure 2.
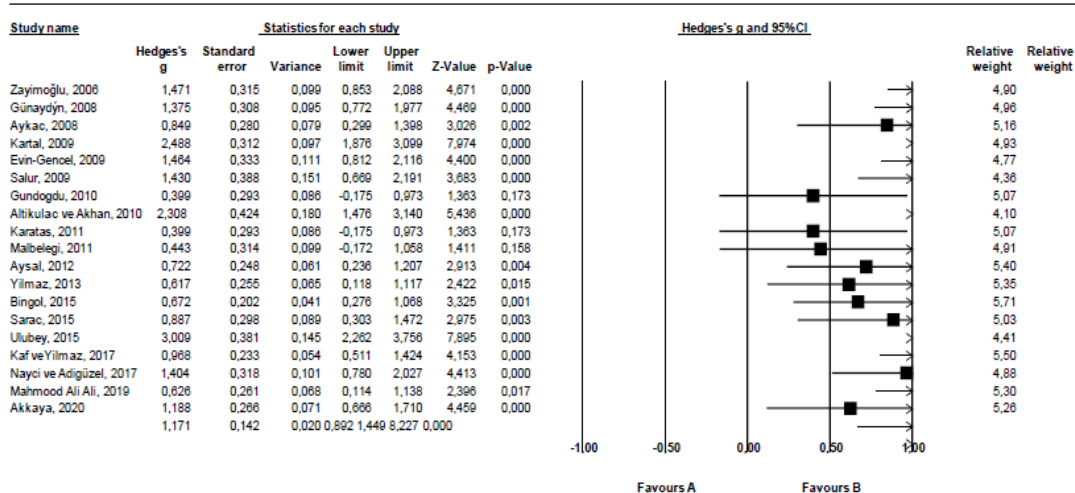
Meta Analysis

Figure 2. Forest plot showing effect size values of studies

When the effect size values of the studies were examined in terms of Figure 2, it was seen that 3 studies had a small positive effect (Gundogdu, 2010; Karatas, 2011; Malbelegi, 2011), 4 studies had a moderate positive effect (Aysal, 2012; Bingol, 2015; Mahmood Ali, 2019; Yilmaz, 2013), 3 studies had a large positive effect (Aykac, 2008; Sarac, 2015; Kaf & Yılmaz, 2017), 4 studies had a very broad positive effect Akkaya, 2020; Gunaydin, 2008; Nayci & Adiguzel, 2017; Salur, 2009), and 5 studies had a perfect positive effect (Altikulac & Akhan, 2010; Evin-Gencel, 2009; Kartal, 2009; Zayimoglu, 2006; Ulubey, 2015). Based on the random-effects model of the average effect size values of the studies, the effect size value was calculated as 1.171, the standard error of the average effect size was 0.142, the lower limit of the confidence interval of the mean effect size was 0.020, and the upper limit was 0.892. t Regarding the weight of the research, it was found that the study with the smallest (4.10%) weight percentage belonged to Altikulac and Akhan (2010), and the study with the largest weight percentage belonged to Bingol (2015). In the study, it was found that the weight percentages generally had similar values. The effect sizes of the studies conducted with the creative drama method according to the years, types and class levels are as in Table 4.

Table 4. *Effect sizes in terms of the year, type and class level of the studies*

Variable	Frequency	Effect Size	Standard Error	Variance	95% Confidence Interval
Year of the Research					
2006-2012	10	1,208	0,216	0,047	0,784- 1,632
2013-2020	9	1,168	0,203	0,041	0,770- 1,565
Type of the Study					
Article	4	1,486	0,267	0,071	0,963-2,003
Thesis	15	1,113	0,166	0,028	0,787-1,440

Grade Level of the Sample Group					
4th Grade	5	0,709	0,115	0,013	0,484-0,935
5th Grade	4	1,019	0,254	0,064	0,522-1,516
6th Grade	5	1,446	0,340	0,116	0,780-2,113
7th Grade	5	0,900	0,160	0,026	0,586-1,214
8th Grade	2	2,733	0,344	0,118	2,060-3,407

In terms of the analysis results given in Table 4, the effect size of the studies published between 2006-2012 (d = 1.208) was higher. When the type of studies was examined, it was seen that the effect size of the studies written in the article type (d = 1,486) was higher. When the effect sizes of the sample group according to the class levels were examined, it was determined that the class with the huge effect size was the 8th grade (d = 2,733) and the class with the lowest effect size was the 4th grade (d = 0,709).

4. Conclusion, Discussion and Suggestions

The first finding of this study, in which the effect of creative drama method on Social Studies course achievement was examined, was the description of the frequency and percentage distributions for the moderator variables. It was seen that the studies included in the scope of the research were mostly thesis (f = 15, 78,95%). The studies conducted vary between the years 2006-2020, and it was determined that most studies were carried out in 2009 and 2015 (f = 3, 15,79%). Looking at the grade level of the sample group, it was determined that more studies were conducted at the 4th, 6th and 7th (f = 5, 23,81%) grade levels.

In order to determine the effect of creative drama method on Social Studies course achievement, individual effect sizes and overall effect size of 19 studies were calculated. Also, a comparison was made between groups by calculating effect sizes according to moderator variables. In the study, three methods were used to determine the publication bias. These were Funnel plot, Orwin N number, Duval and Tweedie's trim and fill method. Hedges'g coefficient and the classification made by Thalheimer and Cook (2002) were used in calculating the effect size. When the effect size value was positive as a result of the analysis, the study was interpreted as in favour of the experimental group, and when it was negative, it was interpreted as in favour of the control group (Wolf, 1988).

In the study, it was concluded that the studies conducted with the method of creative drama (Q = 90,019 p <0,05; I^2 = 78,893) showed a heterogeneous distribution and there was no publication bias. According to the results of the research, the creative drama method had a very wide effect size (d = 1,171) on social studies course achievement in favour of the experimental group. When the effect size value obtained was compared with other studies conducted in the literature, it was understood that similar results were obtained. In their study examining the effect of creative drama method on academic achievement, Ulubey and Toraman (2015) made a meta-analysis of 65 experimental types of research, including 23 articles, 37 master's theses and 5 doctoral dissertations. As a result of the analysis, it was determined that the creative drama method had a very wide (d = 1,255) positive effect size on the achievement of the course. Similarly, Batdı and Batdı (2015) found that creative drama had an huge effect (d = 1.68), a positive effect on academic achievement. And also, Akdemir and Karakus (2016) tried to determine the effect of creative drama method on academic achievement, and analyzed 27 theses in this context, and concluded that creative drama had an huge effect (d = 1,648) on academic achievement. In the study conducted by Ozbey and Sarikaya (2019), the effect level of the studies carried out through drama method in Turkey was analysed in terms of different

variables, and it was found that the effect of these studies on academic achievement was positive at a very large level (d = 1.24). Apart from the meta-analysis study conducted in Turkey, Conard (1992) and Lee, Patall, Cawthon and Steinguth (2015) found that the drama method had a medium and positive effect on student achievement. As a result, the effect sizes of all the mentioned studies were found to be medium or higher and positive. The results obtained from the studies largely were in line with the results obtained from this study.

In the literature, meta-analysis studies about the creative drama method are generally not limited to a discipline or a course. It was observed that the determined content was created by including all the studies. Similar to the results of this study, which is limited to Social Studies course achievement, there are different studies investigating the effect of creative drama on a variety of lessons. In 17 studies in which Şimşek and Karatas (2020) investigated the effect level of creative drama method in Science Education, the effect size was found to be positive at a large level (d = 1,109). Canturk and Gunhan (2016) concluded that the effect of the drama method on mathematics achievement was strong and positive (d = 0.931). When the results of the research are compared in general, it is seen that creative drama method is more effective in Social Studies course success. The drama method is more suitable for verbal courses in terms of the structure and application of the lesson (Lee et al., 2015). Considering the studies conducted in general, it was found that it had a broad and positive effect in terms of academic success in courses such as Social Studies, Turkish, English and Informatics, and it had a moderate, positive effect in quantitative courses such as Mathematics, Science and Technology (Özbey & Sarıkaya, 2019).

The third finding of the study is to examine the effect level of the effect of creative drama on Social Studies course success in terms of moderator variables (the year the research was conducted, the type of the study, the grade level of the sample group). When the effect sizes of the studies were calculated based on the year the research was conducted, it was determined that the effect size values were very wide and positive. The effect size of the studies conducted between 2006-2012 was higher than the studies conducted in 2013 and after. When the effect of the creative drama method was examined in terms of the type of the study, it was observed that the effect size of the studies conducted in the article type was huge, positive (d = 1,486), and the effect sizes of the studies conducted as thesis were very large and positive (d = 1,113). However, this difference was thought to be due to the number of studies. When the effect size was calculated in terms of the grade level of the sample group, 4th grade (d = 0.733) had the lowest effect size level, and 8th grade (d = 2,709) students had the huge effect size level. While creative drama had a moderately positive effect on social studies course success at the 4th-grade level, the effect it created at the 8th-grade level was huge and positive. Ozbey and Sarikaya (2019) found the overall effect level by grade level as having a broad and positive effect in kindergarten, primary school, secondary school and higher education, and only small, positive effect at the secondary level. When the studies conducted at the 8th-grade level were examined, it was seen that only 2 studies had been conducted. Also, the reason for the moderate effect of the method applied at the 4th-grade level may be due to the lack of development of abstract thinking skills of the students in this age group. When the method is applied, it can be perceived as a game by the students rather than its teaching.

When the research results are evaluated in general, it is understood that the creative drama method has a wide and positive effect on the achievement of the course. Therefore, activities related to the creative drama method should be encouraged to be used in the education and training process, and efforts should be made to improve their quality. Apart from this suggestion, the following suggestions have been made considering the results obtained in the study.

- In the study, it was tried to determine the effect of creative drama on lesson success. In future studies, its effect on students' attitudes, motivation and self-efficacy can be investigated.

- The effect of creative drama method applied in Social Studies course was tried to be determined. It is seen in the related literature that meta-analysis studies on creative drama are not limited to a course or a topic. For this reason, it can be tried to determine the effect of creative drama method on different lessons.

- The year the research was published, the type of the studies and the grade level of the sample group was determined as the moderator variable in the study. In future studies, moderator variables can be diversified and their number can be increased.

- When the effect size was calculated according to the class level of the sample group, it was found that the effect of creative drama method at the 4th-grade level was medium and positive. At this grade level, the quality of the work to be done to improve the effectiveness of creative drama method can be increased or alternative teaching methods can be used.

5. Conflict of Interest

The author declares that there is no conflict of interest.

6. Ethics Committee Approval

The author confirms that the study does not need ethics committee approval according to the research integrity rules in their country.

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TEACHING SCIENCE THROUGH DISTANCE EDUCATION DURING THE COVID-19 PANDEMIC

Research article

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TEACHING SCIENCE THROUGH DISTANCE EDUCATION DURING THE COVID-19 PANDEMIC

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Abstract

The aim of the present study was to evaluate the views of parents regarding middle school students' learning of science at home via the Educational Information Network, prepared by the Turkish National Ministry of Education, during the course of urgent distance education to which an immediate obligatory transition was made with the outbreak of the Covid-19 pandemic. Of the qualitative research methods, the basic qualitative research model was employed in the present study. The participants of the study were the parents of 6th grade students attending a middle school in the Central Anatolian Region of Turkey. The maximum diversity sampling method was utilized for sample selection in the study. Accordingly, the study was conducted with 17 parents of students, who possessed different features and were willing to participate in the study. The results of the research study revealed that generally parents believed that science education via EBA was beneficial for the students that the visuals and videos used during science instruction were arresting, that EBA was an enjoyable platform, and it had advantages such as the possibility to do experiments virtually.

Keywords: Covid-19, pandemic, distance education, EBA, science education, middle school, parent

1. Introduction

The Covid-19 pandemic, which initially emerged in the city of Vuhan in China at the end of the year 2019, has taken hold of the entire world. One of the areas that the pandemic has impacted the most, in fact profoundly shaken, is education (Erkut, 2020) because in almost all countries it was education that first came to a halt to control the pandemic. Subsequently, to minimize the adverse effects of this situation, the decision was taken to make a transition to distanced learning (Sahu, 2020; Erkut, 2020). However, this so-called urgent distance learning, which started without a detailed education design and plan, has virtually been a process of crisis management. Hence, each institution has been overcoming this crisis by means of different solutions (URL-1).

When compared with the other European countries, Turkey faced the Covid-19 at a relatively later stage. However, after it was understood that the pandemic was going to spread, the applications of countries that began struggling with the virus earlier than Turkey were evaluated. Accordingly, with the World Health Organization declaring a pandemic on 11th March, 2020, Turkey also initially gave a short break to education and soon after started distanced education (Ministry of National Education [MEB], 2020). During the one-week halt

in education, the Ministry completed its work on two pathways that it planned to adopt in distanced education: the online educational platform called Educational Informatics Network and the Educational Informatics Network TV (EBA TV). Established by the Ministry of Education and the Turkish Radio and Television Association, EBA TV consists of three new channels. In these channels, a program designed for classes, in which prerecorded lessons are broadcasted, is shared with the students throughout the day. Moreover, students were provided with the opportunity to benefit not only from EBA TV but also from a website developed by the National Ministry of Education and has been in use since the year 2011, namely EBA, to which new features such as online lesson functions were added (Özer, 2020). However, as evident, this has been a rapid transition. Numerous students and teachers who had no prior experience in distance education were suddenly subjected to this experience (Laplante, 2020). Even though this transition had positive aspects such as ensuring the sustainability of education, and preventing disruptions in students' graduation times and falling behind a term, as it was an urgent transition, it also raised certain discussions regarding its feasibility and efficiency (Sahu, 2020). At the center of the discussions have been the concern that practical lessons would be disrupted. It can be stated that the subject of Sciences has an important and special place at this point because not only is sciences a subject that includes abstract topics, but it is also a practical subject that requires many different methods of application, such as experiments and projects. On the other hand, as a branch of science that stemmed from research conducted to gain insight into and understand nature, sciences is intertwined with the technologies developed for these purposes and, in fact, its contribution to the development of technology is of considerable importance (Soslu, Dilber and Düzgün, 2011). Conversely, it is also known that it is essential to benefit from technology during the course of a quality science education (Ballıel Ünal, 2017). In other words, it can be maintained that technology and sciences are closely related and support each other. When all these points are taken into consideration, the evaluation of the subject of sciences implemented via distance education, in the light of which essential arrangements can be made, is considered important. Hence, it is hoped that the present research study will serve as a response to the discussions on how distance education should be implemented in specifically the subject of sciences.

When considered overall, this unfavorable condition that is being experienced displays the importance of distance education. However, it is also a fact that an urgent transition to this system necessitates increasing its effectiveness with improvement works. It is clear that this improvement cannot be obtained solely by improvement in the technical infrastructure and Internet facilities. It is believed that works will be more meaningful if they are based on the views of the stakeholders subjected to this system. However, it is observed that while teachers and students have been included in the studies that have been conducted, parents have been neglected. In fact, parents play an important role in distance education by providing their children parental support and the necessary facilities at home. Furthermore, a review of the studies conducted after the onset of the Covid-19 pandemic reveals that mostly tertiary education has been the subject of research (Dikmen and Bahçeci, 2020; Durak, Çankaya and İzmirli, 2020). It is for this very reason that the present study can be claimed to be unique and current. Moreover, it is believed that the study will provide important data for the related literature and the course of distance education, for which improvement works are in process within an education system that undergoes continuous change. The aim of the present research study conducted within this scope was to examine the views of parents regarding the subject of Sciences implemented through distance education by means of the National Ministry of Education during the Covid-19 pandemic.

2. Method

2.1. Research Design

Of the qualitative research methods, the basic qualitative research model was employed in the present study. In basic qualitative research, how individuals interpret or construct meaning of the research topic within their interactions with their social worlds (Merriam, 2013).

2.2. Participants

The participants of the study were the parents of 6th grade students attending a middle school in the Central Anatolian Region of Turkey. The maximum diversity sampling method was utilized for sample selection in the study. Accordingly, the study was conducted with 17 parents of students who possessed different features and were willing to participate in the study. Of the parents of the students, 11 were female and 6 were male. The occupations of the parents ranged between being a housewife, teacher, scientist, nurse, retiree and academician. Figure 1 depicts the code names assigned to the parents, their gender, and their occupations.
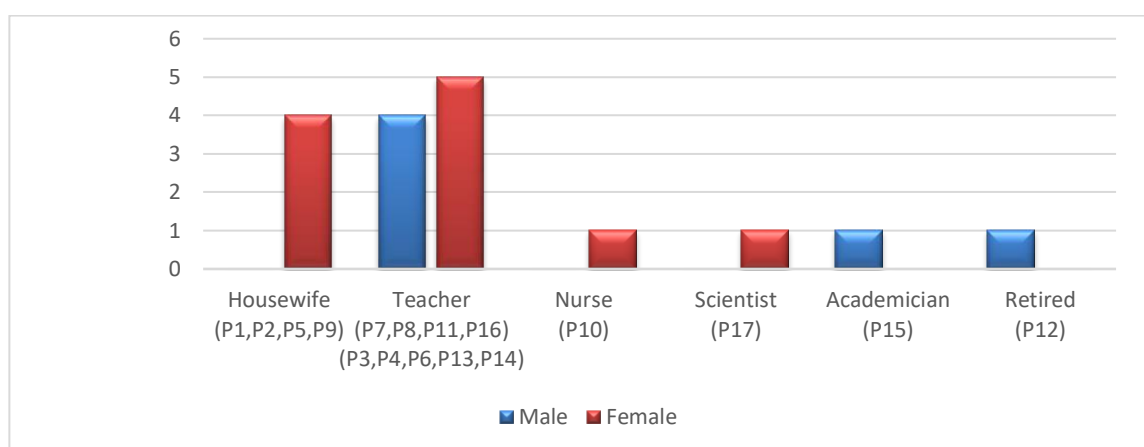

Figure 1: Parents participating in the research

2.3. Data Collection Tools

The data of the research were collected by means of semi-structured interviews, one of the qualitative data collection methods. To this end, initially an interview protocol that was appropriate to the aims of the research study and which consisted of open-ended questions was prepared. The prepared protocol was submitted to two experts who held Ph.D. degrees in the areas of science education and instructional technologies for expert opinion. In addition, expert opinion was received from a Turkish language expert. The protocol was finalized after both the domain experts and the language expert decided that the protocol was suitable to be used in the research.

2.4. Data Collection

The data of the research were collected by means of semi-structured interviews. Prior to the interviews, the participants were informed about the confidentiality of the data and identity information. Due the pandemic, the interviews were held online on a day and at a time when the parents and researchers were available. Each interview lasted approximately 20 minutes and all the interviews were completed over a period of ten days.

2.5. Data Analysis

Before data analysis, preliminary preparations were made in the study. Within this scope, initially the interviews were transcribed, compiled into an MS Word document, and then

checked. Subsequently, each transcription was assigned a number such as P1, P2, P3 etc. Then the analysis process was initiated. The data in the study were subjected to content analysis. Content analysis can be defined as the data being arranged in a meaningful way, and the process of forming categories based on the relationships that explain the data (Yıldırım and Şimşek, 2011). In the present study, the data were analyzed by two researchers. To identify the consistency between the two experts the Miles and Huberman (1994) [Concensus/ (Dissidence + Concensus) x 100] formula was used and the consistency between the cores was calculated as 93%.

2.6. Validity and Reliability

To increase the validity of the research, the process of the research has been explained in detail, and the findings have been presented together with direct quotations from participant responses. Furthermore, to ensure internal validity (credibility), two researchers played active roles during all the stages of the research such as the collection of data and data analysis; that is, researcher triangulation was performed (Yıldırım and Şimşek, 2011).

The research process has been explained in detail to ensure transmissibility in these kinds of qualitative studies. To provide evidence for the reliability of the research study, the inter-coder consistency was calculated (93%). In the literature, the inter-coder consistency is recommended to be 80% and above (Patton, 2002; Yıldırım and Şimşek, 2011). Accordingly, it can be stated that the research is reliable.

2.7. Limitations

This study, in which the views of parents regarding the implementation of the sciences subject via distance education in middle schools, is limited to 17 parents' views. Moreover, that the Covid-19 pandemic was being experienced while the research was conducted and, hence, this negative situation could have reflected on the responses of the participants should be taken into consideration.

3. Findings

3.1. The General Views of the Participants regarding their Children's Learning Science at Home via EBA during the Pandemic

The initial question posed to the participants in the study was as follows: "*What do you think about your child's learning science at home via EBA? Could you evaluate it?*" The findings are presented in Table 1.

Table 1. *Learning science at home via EBA*

Category	Parents	Frequency
Useful	P1, P3, P4, P5, P6, P7, P8, P10, P12, P14, P15, P16, P17	13
Partially useful	P2, P6, P9, P12, P16	5
Useless	P11, P13	2

As can be observed in Table 1, the parents generally evaluated learning science via EBA in three categories, *namely useful, partially useful, and useless*. By examining the rate of representativeness of these views, it can be observed that the majority of the participants viewed science instruction via EBA to be sufficient (f=13). Moreover, some parents who found the system to be useful reported insufficient aspects of the system. To illustrate, P9 said, "*I find it useful but insufficient because the duration of the lesson is short…*" Another parent, V16, expressed his/her view by saying, "*It is a useful initiative but difficult for it to be beneficial;*

for it to be used effectively, teachers need to use information technologies well and students need to be motivated to learn. As a teacher, I have repeatedly witnessed some students opening up EBA and moving away from their computers."

There were only two participants who described science instruction via EBA as useless. V11, who reported such a view and was a teacher him/herself, said, "*I don't find favorable very much. It does not substitute for face-to-face education.*"

3.2. The Views of the Participants regarding the Effectiveness of Science Instruction Implemented via EBA during the Pandemic

The parents who participated in the study were asked the following question: "*Do you think science instruction via EBA is implemented effectively? Are the lessons effective? Why do you think so? Could you please explain?*" They responded to this question as presented in Table 2.

Table 2. *The effectiveness of implementing science instruction via EBA*

Category	Codes	Parents	Frequency
Yes, they are effective.	The visuals and videos are arresting.	P1, P3, P7, P8, P15, P16, P17	7
	There are activities for reinforcement.	P4, P5, P7, P8, P14, P16	6
	It is effective for exam preparation.	P10, P16	2
No, they are not effective.	It is insufficient; it needs to be improved.	P2, P6, P9, P11, P12, P13	6
	The duration of the lessons are short.	P9, P11	2
	It should be based on experiences and experiments.	P6	1
	Feedback is insufficient.	P8	1
	Looking at the screen is unhealthy.	P16	1

It can be observed in Table 2 that the number of participants who viewed science instruction via EBA to be effective is high. The participants justified their views by claiming that the visuals and videos used in EBA were arresting, that there were activities for reinforcement, and that it was effective for exam preparation. However, upon closer examination of the participants' statements, it can be observed that the participants expressing that the system was effective also mentioned some insufficiencies. For example, one parent, V16, who believed that the system was effective, said, "*I believe that it is effective for exam preparation but when education is under consideration, I don't think it is suitable for children. Looking at the screen for hours is not easy for children. Such things as animations are effective but it requires students to have a great deal of self-regulation.*"

Based on the figures in Table 2, it can be observed that there is a considerable number of parents who believed that the system was not effective. These participants explained their views by claiming that improvements were needed in EBA, that the duration of the lessons and feedback were insufficient, that the lack of hands-on, experiential learning would not secure permanent learning, and that looking at the screen was unhealthy. To illustrate, P6 expressed his/her views as follows: "*No I don't think it is effective. Science is not a subject that can be learnt merely through the visual and auditory domains of learning. Science can be taught*

permanently by hands-on and experiential [learning]." However, as can be observed in Table 2, the majority of the parents who claimed that the lessons were ineffective merely stated that they expressed their view as such as they did not find education via EBA sufficient and that EBA needed to be improved. Accordingly, it can be deduced that if science instruction implemented via EBA is improved and developed, parents' views may become positive.

3.3. The Views of the Participants regarding the Advantages and Opportunities of Science Instruction Implemented via EBA during the Pandemic

The participants were asked the following question: "*Does science instruction via EBA have more advantageous aspects than does science education at school? If so, what are they? Why do you think so? Could you please explain?*" In general, the parents reported that they found the presentation visuals and the videos arresting, that it was easier to focus on the TV at home than on the board in the classroom, that students were not afraid to make mistakes, that students realized their own deficiencies more easily thanks to individualized instruction, that the opportunity of repeating the content was an advantage, that they received education in an enjoyable way, and that it contributed to their self-confidence. In addition, there were parents who claimed that experiments could be conducted virtually and in this way students could see the results of their experiments in a more safe environment, and that the contents were quite rich. The response of P4 can be given as an example to these mentioned advantages: "*A more comfortable home environment enables students, who are not afraid to think freely or make mistakes, to gain self-confidence while answering questions.*" Similar views were expressed by P3 as follows: "*Yes, the video presentations are more arresting. Crowded classrooms and the time sacred for each child to talk do not leave time to watch the visuals from time to time. From this aspect, children can find the opportunity to and can focus without losing their attention while watching EBA.*" Another parent, P7, stated, "*It provides students with a both educational and enjoyable learning opportunity. Interactive and animated lesson vides can be given as examples to illustrate this. In addition, the rich educational content, topic inputs, lesson presentations, and the topic and review tests are highly valuable resources for the students.*"

The parents expressed that they generally liked the visuals and videos used in EBA, that education was done in a comfortable environment, and that the lessons were enjoyable and had enriched content. However, while the advantages of EBA were mentioned, there were also comments stating that the duration of the lessons were short. It is believed that by revisiting the issue of lesson durations, one factor casting a shadow on the advantages of science instruction via EBA can be eliminated.

3.4. The Views of the Participants regarding the Disadvantages and Obstacles of Science Instruction Implemented via EBA during the Pandemic

The participant parents' responses to the following question — "*Does science instruction via EBA have more disadvantageous aspects than does science education at school? If so, what are they? Why do you think so? Could you please explain?*" — were mainly based on the limited possibility of providing corrective feedback. Generally parents stated the deficiencies of the sistem as the difficulty of providing students with corrective feedback regarding any one of their behaviors, the insufficiency of the lesson duration, the limitation of learning through experiments, which are in the nature of science lessons, lack of active participation in the lessons, and the elimination of the possibility of students' social interaction with each other. In addition, the participants put forward that with the elimination of class discipline, focusing problems could be experienced when there are other distracting situations within the home environment. In relation to this point, P4 expressed his/her view as follows: "*At school rather than self-discipline, there is external classroom teacher control. Every child at home may not be able to engage in regular study. S/he may not be able to focus on his/her lessons. This could*

constitute a disadvantage." Similarly, P8 said, "*It is difficult for the child to pay attention while listening passively to the screen. S/he cannot get immediate feedback to a question that arises in his/her mind. S/he cannot have his/her own idea, example, or the topic-related image that s/he envisions confirmed. S/he lacks the part that s/he can learn through interaction with his/her peers.*"

Moreover, some parents emphasized that the conditions of the students varied in terms of gaining benefit from the infrastructure of EBA, and that students should not have any obstacles to benefitting from EBA. To illustrate, P12 expressed his/her views as follows: "*Currently our children and the infrastructure system of EBA are not well-matched because not all children have the same opportunities; there isn't a computer nor Internet in all every child's home. These problems should first be eliminated and then transition to distance education should be made.*" Thus, it can be claimed that P12 has highlighted problems arising from insufficiencies in technical infrastructure and equipment.

Accordingly, to improve EBA further, it will be quite useful to specifically focus on corrective feedback and measurement and assessment, to provide students with tasks and activities related to social interaction and the ability to focus on the lesson, and to ensure that they have equal opportunities in terms of technological equipment.

3.5. The Views of the Participants regarding the Effect of Science Instruction Implemented via EBA on Motivation to Learn during the Pandemic

The parents participating in the study were asked the following question: "*Do you think science instruction via EBA affects your child's motivation to learn science? In what way? Why do you think so? Could you please explain?*" The findings of the analysis of the parents' responses are presented in Table 3.

Table 3. *The effect of science instruction via EBA on motivation to learn*

Category	Parents	Frequency
Positive effects	P3, P4, P5, P7, P8, P11, P12, P13, P14, P17	10
Negative effects	P6, P9, P10, P16	4
No effects	P1, P2, P15	3

As can be observed in Table 3, the majority of the parents stated that science instruction via EBA had a positive impact on children's motivation to learn. To illustrate, P3 said, "*I think it can have an effect. In lessons based on the textbook, the subject of Science can remain abstract. But the aspects that become more concrete as it is watched can have a positive touch upon any of the child's interests.*"

P7 said, "*Our observations are that it affected the attitude to the subject of Sciences positively because s/he understood that s/he could reinforce what s/he learnt at school on EBA within the Internet environment and realize a more permanent learning.*"

P6 stated, "*EBA can be useful only if it is used as supplementary education, but if the system of the lesson continues in this way, students' interest in science will decrease.*"

Even though science instruction via EBA had a positive impact on students' motivation, when parents were asked to compare it with learning science at school, the majority of them stated that they did not see the eagerness and excitement of learning at school. They attributed this to some factors such as the difference between the school teachers and those teaching on EBA, the lack of class discipline on EBA, and the inadequacy of student-student and student-teacher interaction. To illustrate, P12 expressed the following: "*In my view, when compared*

with EBA, science education at school was better because experiments, observations, discussion with peers, teacher explanations were more effective." As can be observed, that their students did experiments and observations at school, and interacted with their teachers and friends were considered more valuable than the education they were to receive from EBA.

3.6. Parents' Views Regarding Distance Education After the Pandemic is over

The parents participating in the study were asked the following question: "*Would you like the process of distance education via platforms such as EBA to continue after the pandemic is over? Why?*" The findings that the analysis of the participants' responses yielded are presented in Table 4.

Table 4. *The desire to use distance education after the pandemic is over*

Category	Parents	Frequency
It could be possible for reinforcement purposes.	P1, P3, P4, P5, P6, P7, P10, P13, P16	9
Yes, I would want it.	P8, P9, P12, P17	4
No, I wouldn't want it.	P2, P11, P14, P15	4

As can be observed in Table 4, parents hold the view that education via EBA should generally be used for supplementary purposes.

To illustrate, while P7 said, "*I would want the support of digital education networks such as EBA to continue after the pandemic is over, just like it was before the pandemic because long summer holidays do not decrease the permanency of educational learnings,*" P8 expressed the following view: "*Yes, I would like it to continue because there is always the probability that life will come with surprises; children started to manage their own education with this platform. If it continues, even when there are obstacles in the way of education, s/he would be able to manage it on his/her own.*" As can be observed, the parents held the general view that receiving face-to-face education could be more useful for the students, and that such distance education platforms as EBA could be more useful when used for purposes of supplementing the lessons.

4. Discussion

The present research study was conducted with the aim of evaluating the views of parents regarding middle school students' learning of science at home via the EBA platform, prepared by the Turkish National Ministry of Education, during the course of urgent distance education to which an immediate obligatory transition was made with the outbreak of the Covid-19 pandemic. The fundamental finding of this research study is that the parents participating in the study consider science instruction via EBA effective despite a series of deficiencies accompanying it. Consistent with this finding, it was revealed in a study by Yılmaz et. al. (2020) that 83.67% of the parents participating in their study considered the education provided by EBA useful or partially useful. A report prepared to evaluate the distance education which Bahçeşehir University (BAU) the Faculty of Education started to implement with the outbreak of the pandemic also shows parallel findings with those of the present study. In the report, it was indicated that parents' priority was to have education implemented in the traditional classrooms, but in circumstances when this was not possible, they were pleased with the platform that was used currently. Moreover, the parents in the same study stated that they were in favor of the use of this platform to supplement in-class face-to-face education. In the same report, the students in middle and high school were also asked to make an evaluation of distance education during the pandemic period. The data obtained revealed that middle and high school students found the learning process via distance education beneficial, that they found the

education provided sufficient, and that they wanted to continue some of their lessons in this way (URL-2).

The findings revealed in the present study that EBA is useful, convenient, effective in the process of instruction show consistency with those findings revealed in a study conducted by Timur, Yılmaz and İşseven (2017) with the aim of identifying middle school students' views in relation to EBA. The researchers arrived at the findings that students' aims in accessing EBA out of class time was to review the topics covered in the lessons, to play games, to solve tests and to do the assigned homework. On the other hand, it was determined that during class time, the majority of the students did not find the use of EBA sufficient and attributed this to the Internet connection problems in the school. The experience of the distance education process with the outbreak of the Covid-19 pandemic, that is, the use of EBA out of class time being useful and effective for the children of the parents participating in the related study show consistency with those findings reported by Timur, Yılmaz and İşseven (2017).

Kurtdede Fidan, Erbasan and Kolsuz (2016) examined the views of primary school class teachers in relation to the benefits of EBA, and they revealed that the use of EBA increased students' interests toward and their participation in the lessons. Moreover, they reported findings that the use of EBA facilitated learning, made lessons more enjoyable, made access to information easy, and increased students' attention span. These findings also show parallelism with the views obtained from the parents participating in the present study. Similarly, in a study conducted by Çiftçi, Taşkaya and Alemdar (2013), primary school class teachers were found to hold the view that EBA would add visual elements to learning and make access to learning easy. In another study, carried out to examine the impact of web-based distance education on the students' success in the topic of change of state, it was revealed that distance education had a positive impact on success (Ballıel Ünal, 2017). Furthermore, it was identified that web-based teaching of the topics of force and movement increased middle school students' academic achievements, ensured the permanency of their knowledge, and developed their ability of scientific process (Daşdemir and Doymuş, 2012). In many other studies like these, it was revealed that web-based the process of distance education increased academic achievement (Aktaş, 2013; Kenanoğlu, 2008; Tüysüz and Aydın, 2007).

Another finding revealed in the present study in relation to parents' views regarding science instruction via EBA was that it had disadvantages such as corrective feedback was insufficient, the lesson duration was insufficient, the opportunity to learn by doing experiments, which are in the nature of the subject of science, the lack of active participation in lessons, the disappearance of the opportunity for students to socially interact with each other, and the problem of focusing. In addition, it was indicated that the conditions of all the students being unequal with respect to their benefitting from the EBA infrastructure was an obstacle. In support of this finding, Telli Yamanoto and Altun (2020) report that education is not productive when there are deficiencies such as problems related to equipment, technical infrastructure and Internet access during the course of distance education. In studies conducted with students, these types of problems are reported to be experienced (Hammond et al., 2020; Owusu-Fordjour, Koomson and Hanson, 2020). A similar finding to the view that social interaction was limited in distance education, expressed by the parents participating in the present study, was revealed in a study conducted by Karakuş et al. (2020) with Turkish teacher candidates. An interesting finding regarding the view of parents participating in the present study in relation to the disadvantages of science instruction via EBA was that distance education did not coincide with the nature of the science subject since such practices as experiments were not implemented in distance education. Similar to this finding, in the report prepared by BAU, it was revealed that teachers believed practical lessons would be inefficient in the process of distance education. Likewise, Barış and Çankaya (2016) as well as Özköze, Arı and Çakır

(2013) arrived at the conclusion in their studies that the participants of their studies did not believe that distance education was appropriate for practical lessons. As a matter of fact, this opinion is the product of a bias or the inability to go beyond structures that one is accustomed to because in reality with the rich content off in distance education, it is possible to offer some practical and interactive lessons more effectively than face-to-face education (Barış and Çankaya, 2016). The points that require careful consideration here is for teachers to be experienced and knowledgeable in integrating technology into educational practices and the software to be rich in content.

In the present study, the views of the parents as regards distance education in the specific subject of Sciences were evaluated and presented above as positive and negative aspects. A similar study was conducted by Özköse, Arı and Çakır (2013) to perform a SWOT analysis of distance education. The strong aspects of distance education reported in the mentioned study of these researchers were that the opportunity it provided students with in terms of learning independent of time and space, its potential to reach out to all students, program diversity, and technical support. The insufficiency of the interaction between students and teachers and theoretical presentations of lessons were found to be the weak aspects of the system. Both studies have common denominators. However, in the present study, the parents did not dwell on distance education providing learning opportunities independent of time and space very much. This could stem from the fact that children are always at home anyway due to the pandemic and that since they are only middle school students, every student may not have a mobile phone, and thus, follows the lessons from the TV.

Another important result that the present study yielded was that the parents participating in the study found face-to-face education at schools more effective but they wanted the use of EBA to be continued as supplementary after the pandemic was over. This result is consistent with the results reported in a study by Yılmaz et al. (2020). These researchers worked with families across Turkey and revealed that a very high percentage of the participants, 92.40%, believed that formal education was more effective than distance education, while 68.52% of the participants believed that when students returned to their schools, distance education should be benefitted from as a means to supplement lessons at schools. In a study by Adnan and Boz (2015), it was observed that the teachers participating in the study were of the belief that in the subject of mathematics, a blended approach, in which the face-to-face learning environment and distance education complement each other, should be used.

The present study arrived at the conclusion that the parents participating in the study were of the view that science instruction via EBA increased students' motivation. This result is in line with that reported in a study by Barış and Çankaya (2016). Just as in the present study, the study by Barış and Çankaya revealed that the participants of the study were of the view that distance education had a positive impact on motivation but stated that there could be problems arising in the area of self-regulation. The increase in students' levels of motivation could be attributed to their belonging to the Z generation, who love technology very much and use it actively.

5. Conclusion and Recommendations

The present research study revealed the views of parents regarding children's learning of the subject of sciences at home via EBA, prepared by MNE, during the urgent distance education to which immediate obligatory transition was made with the outbreak of the Covid-19 pandemic. The general results obtained in the study indicate that the participants hold the following views:

1.   The views of the participants are that science instruction via EBA is of benefit to students and that an effective and strong science instruction can be implemented via EBA. Based on this view, even though the use of EBA has increased with the outbreak of the Covid-19 pandemic, it is recommended that after the pandemic is over, the use of EBA should be continued, and experts in the field of content development should continue to work on this platform for it to supplement students' lessons.

2.   It was stated that, in the process of science instruction via EBA, visuals and videos used were arresting, that paying attention to the TV at home was easier than paying attention to the board in a classroom, that students' level of self-confidence increased as they were not afraid of making errors, that students realized their own deficiencies more easily thanks to individualized instruction, and that there was the advantage of content review via EBA. In addition, that EBA is an enjoyable platform, that experiments could be done virtually, and thus, students can see their experiment outcomes in a safer environment, and that contents are quite rich are among the advantages of EBA. Thus, it can be understood that the visuals and videos on EBA are highly liked by parents. For this reason, increasing the number of these further and producing them more professionally would increase the opportunity to gain effective and worthwhile benefit from the platform. Adding experiments with simulations and animations into specifically contents of the subject of science would have a positive effect on students' attitude to and interest in EBA. Moreover, by taking into consideration other advantages of EBA, such as content review, it would be worthwhile for students to benefit from this platform at home as supplementary to their face-to-face education at school after the pandemic is over. Parents have also expressed the same view.

3.   It was revealed that science instruction via EBA had such disadvantages as the insufficiency of corrective feedback, the inadequacy of the lesson durations, the limited opportunity to learn through experiments, which are in the nature of the science subject, the lack of active student participation in the lessons, the disappearance of students' opportunity to socially interact with each other, and the possibility of creating a problem of focusing. Furthermore, it was stated that the conditions of all the students being unequal in terms of benefiting from the infrastructure of EBA was an obstacle. In light of this finding, the following recommendations can be made: work should be done to eliminate obstacles that can emerge in the hardware or software so that students can benefit from EBA more easily, the duration of the lessons should be increased, experiments should be included by making use of such techniques as simulations and animations, students should be encouraged to conduct experiments at home with simple and inexpensive materials, and a virtual class environment should be established so that there can be interaction between students and teachers. In addition, increasing the question bank and test pools in the content to assess the learning outcomes of students would be of benefit considering the existent understanding of measurement and assessment in the Turkish education system.

4.   Science instruction via EBA has generally impacted students' motivation to learn positively. This shows that it would be worthwhile to continue making use of EBA after the pandemic is over. In future studies with students, the impact of instruction via the EBA platform can be revealed more clearly. When face-to-face education resumes, experimental studies can be designed to do comparative analyses.

5.   Finally, it has been concluded that after the pandemic is over, it would be more beneficial for the students to receive face-to-face education when compared to distance education, and that such distance education platforms as EBA would be more beneficial when used as supplementary to students' lessons. Thus, improving the EBA platform and its mobile application in terms of content and use could contribute to its rate of usage and its prevalence.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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A HOLISTIC APPROACH TO ENTROPY IN SCIENCE EDUCATION

Review Study

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A HOLISTIC APPROACH TO ENTROPY IN SCIENCE EDUCATION

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Abstract

Entropy is a concept with an extreme controversy which many scientists have been trying to explain. Some of the approaches employed in its definition contradict each other, which made it extremely difficult for high school and college students to understand. Boltzmann was the first person who brought a statistical explanation to entropy and linking it with the disorder concept ($S = k\ln w$). The point which received the highest amount of criticism is the similarity between the visual regulation in everyday life and regulation of particles, which is the metaphor that causes the highest number of misconceptions. The primary goal of this study is to go down the roots of the controversy surrounding the entropy concept and propose solutions. In the framework of all these difficulties, the concept was investigated with an integrated and simple approach. In this pretext, the macroscopic and microscopic features of entropy, the difficulties and misconceptions encountered, and the methods used in its education have been thoroughly examined. The final step was developing a "Tripod Approach" to facilitate the explanation of this complicated concept and fill the gaps in this area. In addition to it, alternative energy and probability-based and integrated entropy description, which reflects the essence of both macroscopic and microscopic approaches, was presented, and this description is expected to be a solution for the controversy resulting from the disorder concept.

Keywords: Energy, entropy, unavailability, probability, tripod approach

1. Introduction

Thermodynamics is an essential topic in physics, chemistry, biochemistry, pharmacy, and engineering (Patron, 1997; Sözbilir, 2001). Thermodynamics is an interdisciplinary science with utmost importance and is regarded as the key to natural sciences and affects almost every scientific field ranging from biology to chemistry (Meltzer, 2004; Patron, 1997; Sözbilir 2011). Thermodynamic concepts are of utmost importance to solve nature and enables us to understand nature and nature-based problems such as global warning (Haglund, Andersson and Elmgren, 2015). However, due to the abstract nature of many thermodynamic concepts, especially entropy, they are not easy to comprehend.

The scientific world has been very reluctant to give a net description of many thermodynamic concepts, including entropy (Lambert, 2011). Therefore, the wide use of this concept among different disciplines brings so much contradiction and turmoil with it. Von Neumann explained this situation as (Tribus, M., McIrving, E. C, 1971; Quoted by; Popoviç, 2018): "*since nobody knows what entropy means, the one who used this word always wins."* Unfortunately, this situation caused severe problems in the teaching and learning processes of

this concept. That is why it is crucial to devise a net approach by the investigation of the historical development of this concept.

In this study, firstly, the answers to the following question are to be found:

- What are the macroscopic and microscopic meanings of entropy?
- What sorts of difficulties emerge in the education of entropy?
- What are the alternative approaches and or metaphors in the education of entropy?

As the study proceeded, we attempted to establish an education approach to overcome the problems related to the entropy concept. For this purpose, a "Tripod Approach" based on integrated viewpoints of the Clausius and Gibbs upon entropy was developed.

Since the current entropy descriptions are predominantly based upon the microscopic approach, the macroscopic approach developed by Clausius has been almost forgotten (Popoviç, 2018). As a result of this, it was found that the thermodynamic concepts such as enthalpy, Gibbs free energy, the second law of thermodynamic could not be related to entropy (Haglund, Andersson, and Elmgren 2016). That is why an alternative entropy description was made to overcome the problems resulted from using macroscopic/microscopic approaches (Baierlein, 1994; Kozliak, 2004). Lambert, 2006 mainly developed this description; Haglund et al., 2010; Leff, 2012; Popoviç, 2018, resulting in the eventual development of the tripod approach.

However, the purpose of the study is neither an in-depth analysis of the entropy concept nor enter an argument about this puzzling scheme but establishes an alternative approach to overcome those preceding difficulties.

2. Method of the Study

This study aims to critically review and evaluation of the studies related to the entropy concept. In other words, the study is a qualitative critical examination and synthesis study. In this research, qualitative data for a scientific phenomenon were analyzed with an integrated analysis and an inductive approach, and new findings were obtained. According to (Fraenkel, Wallen & Hyun, 2012), qualitative research is a research method to better understand a particular event, where creative studies and new findings are provided. Again, to reveal the relationships between the findings and to reach new results from the findings, the researcher makes comments that will give meaning to the data (Yıldırım&Şimşek, 2008, p. 238). In this study, an alternative teaching approach and a definition for the concept of entropy was developed by analyzing the findings in-depth.

3. Literature Review

3.1. An Integrated Historical Outlook to a Mysterious Concept of Entropy

The history of the entropy concept dates back to the mid-19th century, where the studies to improve the efficiency of the vapor engines were extremely popular. A young scientist Rudolf Clausius gave his utmost attention to thermodynamic studies of Sadi Carnot. Clausius, one of the founders of thermodynamics, was the first scientist who proposed the entropy concept and lighted the fuse of dynamite in his papers published in 1857, 1865, and 1867. Since then, entropy is a mysterious concept with increasing popularity and took the attention of many disciplines.

Popovic (2018) described three different types of entropy, one in information theory, and the other two are in the theory of matter. One of the descriptions of entropy in the theory of matter takes unused energy as the reference (thermodynamic approach), and the other one is

based upon the order or regulation of the particles (statistical approach). The entropy description based upon the information theory was first proposed by Shannon (1948), who explained the entropy "as the measure of probabilities to code a message." According to Shannon, there are two equal probabilities in head /tail draw with a coin, while there are six equal probabilities in throwing dices. Therefore, dice throwing has higher entropy than a head/tail draw. Popoviç (2018) states that the use of all tree entropy description one from the information and two from the matter science would be sufficient and all other descriptions would cause confusion

However, Lambert (2006) claimed that entropy is not dependent solely on thermal effects. According to him, probability also plays an important role and should be taken into account. He emphasized that under these conditions, one needs an integrated approach, and none of the descriptions would be sufficient enough alone. In this pretext, we can conveniently say that Shanon's description based on only the probability concept is far from describing the whole picture.

Unfortunately, the controversies and paradoxes surrendering entropy concept caused its perception to be so complicated, and these complications immediately converted into misconceptions, which results in the deviation from our educational targets (Lambert, 2006; Haglund et al., 2015). That is why both the macroscopic (thermodynamic) and microscopic (statistical) approaches should both be used as an essential manner in the description entropy. Below are the brief analyses of these approaches:

3.2. Macroscopic (Thermodynamic) Meaning of Entropy

The macroscopic (thermodynamic) meaning of entropy is based upon the statements of Clausius. He described the entropy function, which means "transformation" in Greek as (Guillen 1995; çev, Tanrıöver s. 211): "*I chose the word entropy willingly to resemble the energy. Because the physical meaning of these two concepts are too close so they should have a very similar nomenclature"* This indicates that although energy and entropy have certain similarities, they are entirely different concepts. Popoviç (2018) says that Clausius first proposed the concept of entropy when he was contemplating on the question "why the combustion engines could not convert the whole energy into work (useful energy)? As seen here, entropy is though as the lost part of the total energy. Clausius assumed the thermodynamic entropy is the unused part (the part which was not converted into work) of the total energy.

The second law of thermodynamics describes entropy as a physical entity, which is a measure of non- convertible energy. It describes the thermodynamic entropy as the ratio of the non-convertible energy to work. The second law of thermodynamics also states that all the irreversible systems try to bring their entropies to maximum and energies to a minimum by keeping the energy at the least convertible form. Although the thermodynamic meaning of entropy is also given by the second law, the following expressions developed by Kelvin-Planck and Clausius are much more prevalent (Dincer and Cengel, 2001).

Kelvin-Plank expression: It is impossible to draw a certain amount of heat from a hot heat reservoir and produce an equivalent amount of work without transferring a sizeable amount of it to the cold reservoir as a useable energy tax (approximately 65-70% depending to the efficiency). You have to work very hard to get any redemption (making the system as reversible as possible) (Sarasua and Abal, 2016; Xue and Guo, 2019).

Clausius expression*:* No system draws heat from the cold reservoir and transfers it to the hot reservoir without outside help. Heat always goes from a hot reservoir to a cold reservoir. If you want to do the otherwise, you need outside contribution (Sarasua and Abal, 2016; Xue and Guo, 2019).

Since Clausius's expression is based upon a spontaneous natural process (cooling), it is much easier to comprehend. On the other hand, Kelvin–Planck expression is based upon non-spontaneous natural process (heating); it is relatively difficult to perceive for the learners (Xue and Guo, 2019). Andrews (1971; Quoted: Kesidou and Duit, 1993) describe this situation "all the energies finally go to the same situation which certain parts are useless" is a simple expression of the first and second laws of thermodynamics.

Johari (2010) has described the entropy according to chemical thermodynamic as *"It is qualitatively the measure of the extension of the energy of the molecules."* This description reflects the Clausius macroscopic theory adapted to multi-atom systems (Popoviç, 2018).

The mathematical expression of entropy was given by Clausius as $dS \geq dQ/T$. This expression shows that the total entropy is zero for the reversible and more significant than zero for the irreversible processes. This assumes that the entropy is a state function questionable since it is not independent of the routes of the process (Akman, 2013).

Another macroscopic thermodynamic concept that is related to entropy is the Gibbs Free energy, which represents the available energy at constant pressure and temperature $\Delta G = -SdT + VdP$). Here entropy is the unusable or unavailable energy for the conversion to the usable energy (work). $\delta w = \delta w_{useb.} + \delta w_{exp}$ Here the expansion work is regarded as the unusable work. Therefore the first law can be written as $dU = \delta w_{usable} - PdV = TdS + \delta w_{usable} - PdV$.

Gibbs energy is given after solving the derivatives as $dG = dU + d(PV) - d(TS) + \delta w_{usable} = TdS - PdV + PdV + VdP - TdS - SdT + \delta w_{usable} = -SdT + VdP + \delta w_{usable}$. As can be seen, determining the maximum operating condition (i.e., constant T and P) is much easier when using Gibbs internal energy. That is why the most widely used thermodynamic derivative. The unavailable energy here is expressed in the entropy term (Gillet, 2006; Quoted: Popoviç, 2018). The Gibbs free energy is, therefore, the maximum available energy under constant pressure and temperature, which are the conditions (more or less) that exist in our daily lives (Gibbs, 1873; Quoted: Popoviç, 2018).

The second law of thermodynamic facilitates the determination of the maximum work produced in a particular process, and it is a highly valuable asset in engineering. It is possible to calculate energy efficiency values using this feature. The second law of thermodynamics provides an in-depth insight into the mechanistic function of nature (Kesidou and Duit, 1993). It helps us to understand the energy problems of the community (Dincer and Cengel, 2001).

Dincer and Cengel (2001) argued that the science of thermodynamics can be described in a much broader perspective as the science of energy, exergy, and entropy (except for the zeroth and third laws of thermodynamic).In this context, entropy can be described as thermodynamic exergy, an expression of the loss of usable energy in an irreversible system (Hepbaşlı, 2012) or the part of the total energy convertible to other types of energies (Rant, 1964).

3.3. Microscopic (Statistical) Meaning of Entropy

It was not possible to explain the tendency of entropy to increase in spontaneous or irreversible processes using Clausius Thermodynamic theory. The foundation stones of the thermodynamics were laid by scientists such as Boltzmann, Maxwell, and Gibbs (Haglund, Jeppsson, and Strömdahl, 2010). Especially Boltzmann found a statistical explanation relating entropy (S) and microstates (W) as $S = k_B \ln W$ corresponding to an isolated system. Here k_B corresponds to Boltzmann constant with a value of 1.38×10^{-23} J/K (Haglund et al., 2010).

Microstates(W) are the states where the position and momentum of the particles (atoms or molecules) are known. Microstates can easily related macrostates and macro events. In other

words, the higher is the number of microstates, and the higher is the probability (www.entropysite.com). That is why the following description of entropy was generally adapted: *"A state of the system is the measure of the realization of that state. The lower probability states have lower, and high probability states have higher entropy".* This probability-based approach is a much more comprehensive explanation of the second law of thermodynamics (Dincer and Cengel, 2001).

One of the statistical approaches which enable us to understand the entropy concept at the molecular level is the Gibbs equation. Gibs used the following equation to calculate the entropy of a system depending upon the statistical distribution of microstates:$S = k \sum_i p_i lnp_i$. Here p_i is the probability of the microstates of the system. Boltzmann and Gibbs equation also improved our knowledge of entropy at the molecular level. Entropy, according to the Boltzmann, is dependent upon the number of microstates accessible in the system, while the Gibbs equation states that entropy represents the measure of the probability of the microstates. Although both these approaches enable us to do the statistical evaluation of entropy, the quantitative results differ a lot. Haglund et al. (2010) attributed this situation to the fact of Gibbs equation is much more generalized than Boltzmann equation and can be applied in a much more comprehensive range. Although different mathematical models give so-called different results, it is generally accepted that the Gibbs equation gives many correct and generalized results.

Another concept that is widely employed in the statistical evaluation of entropy is "the degree of freedom." According to it, entropy is the measure of the free-acting capacity of the particles. Statistical mechanics is interested in the behavior of the particles (atoms and molecules). To describe the behavior of a particle, we must have a definite knowledge of its momentum and location. Popoviç (2018) stated that to define a particle, one needs three-dimensional momentum and the exact time of it. Therefore, for the definition of 6×10^{23} monoatomic particles, we need 18×10^{23} degrees of freedom. In order to define the instantaneous microstates, we take an instantaneous picture of an ideal gas system in equilibrium where the molecules move arbitrarily. However, since the particles are perpetually in action in spite that they are in equilibrium, microstates change by the time. Therefore one only needs two parameters to define a macrostate; to do the same for a microstate, and you need each degree of freedom in addition to it.

While the controversy surrounding entropy was continuing since Clausius, Boltzmann (1898) aggravated the situation when he tried to link the entropy concept with order/disorder concepts. Akman (2013) explained the order as the distribution of the total energy among particles and the fact that after converting some of the energy as useful work, the system lacks the capacity of returning the previous position.

The quantitative equation of entropy $dS_{rev}=dQ/T$ derived from the second law of thermodynamics does not give us a clue about the absolute value of it. However, the calculation of the number of probable routes for the order of the particles is possible by the third law of thermodynamics. According to this law, the entropy of a perfect crystal at 0 Kelvin is zero. However, if the temperature is deviated from (0 K), there are big changes in the order of the crystal structure, and the remaining entropy is described as residual entropy.

3.4. The Problems Encountered In Teaching Thermodynamic Concepts and Misconceptions

Meltzer (2004) reported in his study seeking the opinions of the students about the thermodynamic concepts that, even though heat, work, and internal energy are entirely different concepts, most of the students could not make this distinction. The students mostly have a hard time understanding the internal energy, and their insistence on this misconception was attributed to their previous knowledge. Similarly, Cotignola et al. (2002) and Erickson and Tiberghien (1985) claimed that students possess instinctive ideas upon heat and temperature.

Pinto Casulleras (1991) reported that the students have a grave misunderstanding of the concepts of conservation of energy and decreasing energy and concluded that the confusion of the similarities and differences prevailing among heat, temperature, and energy stem from the failure of the in-depth investigation of these energy concepts before. There are similar studies in the literature reporting that the students have serious problems to distinguish heat and temperature concepts(Brook, Briggs, Bell, and Driver, 1984; Tiberghien; Quoted by Kesidou and Duit, 1993, Unpublished Ph.D. thesis, 2020).

Christensen and Rump (2008), on the other hand, report that the problems of university students to understand the thermodynamic concepts originated from the fact that they all come from different disciplines. This result was supported by Becker et al. (2013) in their study carried out with a small group containing the students from the chemistry and physics departments. He observed that, while the physicists approach the thermodynamics in a macroscopic manner without taking its microscopic nature into account, chemistry students predominantly chose an approach taking the molecular interactions into account. In a study where the university students studying in different departments were asked to give an order of some thermodynamic concepts according to their relations with entropy, and it was found that their answer differed according to the departments they came from(Haglund, Andersson and Elmgren, 2015; Haglund, Andersson and Elmgren 2016).

The macroscopic change in entropy can be given as $dS \geq dQ/T$ (Thomas and Schwenz, 1998; Haglund and Jeppsson, 2014; Loverude, 2015). For instance, in a thermodynamic course in the engineering department, the students were given survey forms containing six thermodynamic concepts as heat, temperature, work, disorder, energy, and probability, and they were asked to range them according to increasing relation with entropy. As seen from $dS_{rev}=dQ/T$ heat and temperature have a much higher correlation with entropy than disorder; the students chose that the most and the least related concepts are disorder and work, respectively. (Gustavsson, Weiszflog and Andersson, 2013).

Since thermodynamic concepts and especially entropy is regarded among the most difficult concepts to understand by the students, the metaphors and analogies are frequently employed in their education process. The most common metaphor used in the education of entropy is the disorder concept. The disorder concept was first used by Boltzmann to reflect his point of view upon the microscopic world of entropy. However, this concept was subjected to harsh criticism by the scientist all over the world (Styer, 2000; Lambert, 2002; Sözbilir, 2007). Styer (2000), claimed that the entropy is a vague concept which does not fully express what is intended to mention and sometimes it is not sufficient to relate the order/ disorder of a room analogically to the energy distribution. According to Haglund et al. (2010), one of the disadvantages of using disorder as a metaphor in entropy education is concentrating upon the solely mechanical structure and the spontaneous appearance of the microstate.

Many reports are claiming that what the students understand from entropy is mostly disorder (Selepe and Bradley, 1997; Sözbilir, 2007; Gustavsson et al., 2013; Haglund et al., 2015). For

instance, in a detailed study on the knowledge of thermodynamic concepts of engineering students taking the chemical thermodynamic course, the students were given thermodynamic concepts of disorder, degree of freedom, heat, motion, enthalpy, Gibbs free energy, the second law of thermodynamics, spreading and microstates and they were asked to put them in an order according to their relation with entropy and comment on how scientific and applicable they are (Haglund et al., 2016). The data were evaluated according to Spearman's rho scale (Table 1). The data were evaluated according to Spearman's rho scale (Table 1). The low numerical values correspond to a high correlation with entropy.

Table 1: *Averages across the student pairs' rankings of how strongly concepts are related to entropy; how scientific they are; and how useful they are for explaining what entropy is?*

	Strongly Related to Entropy		Scientific		Useful for Explaining Entropy	
Student pairs' rankings of how	disorder	freedom	Gibbs free energy	enthalpy	disorder	freedom
	2.17	2.17	1.67	2.00	1.50	4.50
	enthalpy	Gibbs free energy	disorder	freedom	Gibbs free energy	enthalpy
	6.67	6.33	7.67	7.33	6.17	6.17

When the resulting data are investigated, one immediately realizes a striking result. The students ranked Gibbs free energy, and enthalpy concepts are the most scientific ones among the thermodynamic concept. However, they ranked these concepts as the least related ones to entropy and the least applicable ones. Also, there were similar results reported using the second law of thermodynamics (5.67, 2.33, 5.83). Although it is not scientifically accepted, the choice of the students for the most widely accepted and useful concept was by the far disorder. This is a moral wrecking outcome.

In light of all these data, we can make the following conclusions :

- Both the students and teacher are widely using disorder concept to teach the entropy

- Although the students use the concepts Gibbs free energy and enthalpy, which are very useful in macroscopic explanation entropy, in the solution of the qualitative problems, they were incapable of an in-depth evaluation of their relations with entropy.

- Students have a significant problem in the integration of microscopic and macroscopic explanation of entropy, and they were nearly oblivious about their macroscopic meaning.

Since entropy is directly or indirectly bound to the spontaneous processes and second law of thermodynamics, Haglund et al. (2015) stated that he agrees with Wei et al., 2014, who said that "association entropy with the disorder will alienate the student from the education targets which were based upon second law of thermodynamics."

Therefore, disorder relieved the entropy concept from the burden it has been carrying for so many years. This gap caused the scientist to stay away from one of the essential laws of the universe. In this context, many of the publishing houses declared that they were going to remove the disorder concept used in the explanation of entropy from the textbooks starting from 2013 and will only include energy concepts (Lambert, 2014). However, some people

claimed that it would be unlucky to remove this concept since it would be a useable metaphor for the new-comers (Haglund et al., 2015; Haglund, 2017). It is not possible to agree with this point of view; although this topic is taught with new approaches higher education levels, it was reported that the students mainly stick to the disorder concept (Haglund et al., 2015).

3.5. The Approaches Used in Teaching the Concept of Entropy

Thermodynamic concepts and especially entropy, are fascinating subjects to study in natural sciences (Johnstone, MacDonald and Webb, 1977). However, it is high time we devised an approach to disprove the biased view that the entropy concept will never be fully understood. This view stems from the prejudice of the people that thermodynamics is one of the most challenging courses in science education (Ishida and Chuang, 1997). It was reported the thermodynamic concept in which students waged the hardest struggle is entropy, and it would be wise to give it a priority in future studies (Sözbilir (2001). In addition, there are approaches and metaphors mentioned alternative to the disorder concept in the explanation of the entropy concept. Among these macroscopic (thermodynamic)and statistical (microscopic) approaches the ones which reflect the meaning of entropy in the most realistic way is briefly mentioned

3.5.1. Macroscopic (Thermodynamic) Approaches

The macroscopic approach is mainly built upon the Clausius's views about entropy, and its main interest is the amount of change in total energy. If the first law preserves the total energy, it is not crucial that the total energy is taken as heat, work, or internal energy format. Although the total energy is preserved, maximum useable work shows a decrease according to II. Law and work is much more flexible than other thermodynamic concepts. The decrease in energy is particularly useful to introduce the irreversibility concept to explain the natural processes (Pinto, Couso and Gutierrez, 2005).

The students were interviewed to determine their approach to heat, temperature, energy concepts (Kesidou and Duit, 1993). The workers reported that the students have difficulty distinguishing heat and temperature. The workers claimed that after the introduction of new thermodynamic topics into curricula, an approach centered by the II. law based heat, temperature, and energy concepts must be adapted.

In a series of experiments in a Ph.D. study in the department of physics education investigating the cyclic process of heat engines, the students were observed to have difficulty in the application of the second law of thermodynamics. The problem was found to stem from the lack of knowledge of students in basic thermodynamic concepts such as heat and temperature. The authors also have strongly suggested that before the introduction of the microscopic quantities of thermodynamics, they must be equipped with firm knowledge on the macroscopic properties of the system (Cochran, 2005). In a similar study, Loverude (2002) suggested a familiar and straightforward macroscopic model of the heat generated when using a bicycle pump. He realized that students have difficulties in microscopic approaches as well—starting from the 19th century the entropy education has been given jointly with the macroscopic approach linked with the microscopic approach to explaining the heat transfer process (Baierlein, 1994).

In thermal physics, there was an entirely different macroscopic explanation of entropy where it was represented as heat form (Fuchs, 1987; Herman, 2000; Quoted by Haglund et al., 2015; Goggoli 2010). However, Strnad (2000) claimed that this approach might cause problems for the students as they will meet different thermodynamic evaluation of heat as the course is advanced. Similarly, Barrow (1988) advocated that heat and work were not system properties, and entropy could be linked to only to energy, according to the second law of without involving heat and work concepts.

Another thermodynamic concept used in the macroscopic explanation of entropy is Gibbs free energy. There are so many studies showings that the students are having difficulties linking entropy with other macroscopic concepts (Thomas and Schwenz, 1998; Haglund et al., 2015; Haglund et al., 2016). In a study carried out in the life sciences department, it was reported that Gibbs free energy is much easier to understand and acceptable than entropy. Therefore defining the relation between entropy and Gibbs free energy would be a highly appropriate starting point (Geller et al., 2014).

Although the statistical and thermodynamic variations of entropy seem to be measuring different properties, they would not be separated from each other since the unit of Boltzmann constant (k_b) in statistical mechanics is (J/K), which shows that entropy is clearly linked with both heat and temperature (Haglund, 2010). Similarly, starting from the Joule/Kelvin unit, thermodynamic entropy shows the unused or unconverted energy into work within a certain temperature range (Popoviç, 2017). However, the thermodynamic entropy, which was personally disclosed by Clausius himself, has unfortunately not received any attention for 150 years and left to be forgotten (Popoviç, 2017).

3.5.2. Microscopic (Statistical) Approaches

The microscopic approach is generally concentrated upon a structure that is made of atoms, molecules, or particles. There are many known microscopic approaches, such as energy or distribution of particles, the number of microstates, and degrees of freedom instead of disorder. There are many microscopic approaches, such as the distribution of energy or particles, the number of microstates, and degrees of freedom instead of disorder. Also, the microscopic viewpoint is a predominating approach among the students coming from chemical disciplines (Christensen and Rump, 2008). Haglund et al. (2015) also obtained similar results in a similar study.

The energy distribution of the second law of thermodynamic (energy spreading or dispersal) can be described as "if there are no barriers, all the energy types tend to enlarge larger area than the localized situation." This process is generally measured as the increase in entropy (Lambert, 2006). In literature, strong arguments are going on about the use of "*energy dispersal* or *spreading*. Leff (1996, p:1261) proposed the use of "energy spreading" in place of "disorder" and described entropy as the measure of the unusable part of energy. In this regard, Wei et al. (2014) proposed the removal of the "*disorder*" term from the textbooks and used the *energy spreading* concept instead. He also claimed that since the letter S in "spreading" reminds one of the entropy, it could be used as its abbreviation. However, Philips (2016) said that business of insinuating entropy over the metaphor of spreading had gone too far because it determines the process as an action rather than a noun. Similarly, Jeppsson (2011) warned the scientific audience that the "energy spreading" metaphor is not free of problems because students may think energy dispersal as heat dispersal. He rationalized his idea by claiming both metaphors (heating and spreading) are in gerund form against the possibility of students thinking these two metaphors as the two parallel variables of the same approach. Therefore, Lambert (2006), suggested the use "dispersal," which has a much definite meaning in molecular thermodynamics in place of "spreading," a term which symbolizes the three-dimensional distribution in macro-thermodynamics. Philips (2016) stated that it would be more appropriate to use both these concepts together in the description of entropy.

On the other hand, Haglund (2010) claimed that decreasing entropy down to one single and definite description would be wrong because it would constitute a big problem of the beginners coming from different disciplines. He also claimed that this sort of description is suitable for only specific scientific groups. He said that it would be much simpler and acceptable to use the

spreading of particle concept, which reminds us of the regulation of the components of the system rather than their dispersal (Haglund et al., 2015).

Another concept based upon the statistical approach of entropy is the microstates. Although many articles are suggesting that the use microstates in place of disorder in the literature (Reif, 1999; Kozliak, 2004; Lambert, 1999, 2002a, 2002b; Sözbilir, 2005), Haglund(2010) claimed that by using Gibbs' statistical approach one can obtain a more general expression applicable to a much wider range of systems by the use of Boltzmann entropy formula (2010).

Another concept suggested in the statistical explanation of entropy is the "degrees of freedom" (Styer, 2000; Brissaud, 2005; Amin, 2012). Styer (2000), who makes this suggestion in his study, states that although this concept is as vague as a disorder, the distribution of microstates leaves a positive feeling upon the person. Also, the students were observed to make more comprehensive microscopic and molecular interaction evaluations regarding the pre-course period. Some of the students described entropy as an action of the freely moving particles (Styer, 2000; Brissaud, 2005). In a study related to the degree of freedom, the students attributed entropy to the amount of action before the course. However, as the course ended, there was a vast variation in their ideas of entropy, and most of them linked it to the freedom of movement of the particles (Haglund et al., 2015). However, freedom of movement concept is not enough to describe entropy because students may easily relate the freedom concept is-conceptionally to disorder concept

4. Findings and Discussion

4.1. An Alternative Study Approach in Teaching and Definition of the Concept of Entropy

There is a relatively big controversy going on about the entropy concept, and this eventually is affected by the education field by aggravating the current problems. That is why a new educational approach in teaching the concept of entropy has been developed and an alternative description established by merging the appropriate macroscopic and microscopic approaches with each other. In this connection, first, an integrated education approach and entropy description have been developed. Below is the investigation of these integrated approaches used in the education of the entropy concept.

4.1.1. Tripod Approach

Although there are microscopic metaphors such as distribution index, microstates, degrees of freedom as an alternative of the entropy concept, these approaches neglect the macroscopic nature of entropy (the change of the type of energy). Unfortunately, it is not easy to understand the microscopic nature of entropy using a macroscopic structure, which corresponds to the statistical average of microstates. If we summarize the use of a microscopic (statistical) or macroscopic (thermodynamic) approach alone, it carries a critical risk for the students to misunderstand the entropy concept (Baierlein, 1994). Therefore, it is essential to have a solid perception of the macroscopic features of entropy before dealing with its microscopic properties (Loverude, 2002; Cochran, 2005). In this context, we carried out a group study related to the entropy concept with 11th-grade students (Akbulut, unpublished Ph.D. thesis, 2020). In this study, the students were first briefed upon macroscopic explanation of entropy, and then they were asked to calculate the entropy change of the phase changes from the solid phase to the gaseous state. Most of the results were still based upon the disorder metaphor. However, when 50% of the phase change from solid to gaseous state takes place with energy exchange, and the unconverted energy appears as an increase in entropy (Akbulut, Unpublished Ph.D. thesis, 2020). Although some studies (Haglund, 2017) suggest starting the thermodynamic concepts at the secondary level with entropy and disorder, it is clear that this

sort of approach will hinder the perception of the entropy concept. Because the students will only concentrate on disorder and neglect other related concepts, on the other hand, to start the education of the entropy, adapting a macroscopic approach will pave the way for the microscopic explanation of entropy and minimize the occurrence of misconceptions.

In order to overcome the problems and turmoil regarding how to teach thermodynamics and statistical approaches, a new educational approach is called the "*Tripod Approach*" based upon the macroscopic (thermodynamic) approach of Clasius and Kelvin, and the statistical or microscopic approach of Gibbs has been developed.

In Figure 2, the essential elements of the "*Tripod Approach*" have been illustrated. As seen from Figure 2, the first pot of the tripod represents the main concepts of energy and entropy, the second pod corresponds to the macroscopic (thermodynamic) approaches and unavailability, and the third pod illustrates microscopic (statistical) approaches and probability.
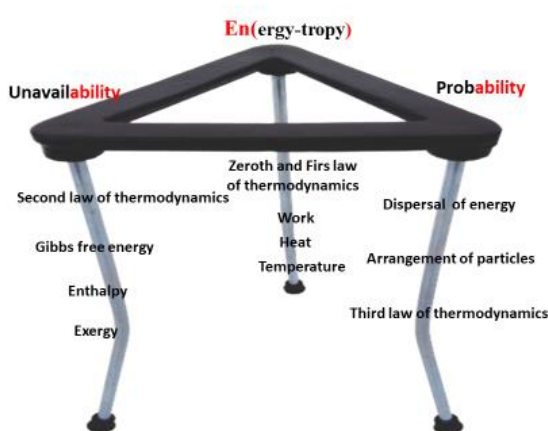

Figure 2: *Tripod Approach*

4.1.1.1. The First Pod: Energy/Entropy "En(ergy-tropy")

The major component of the "*Tripod Approach*" is entropy, which is based upon the conservation of energy. Because the physical means of entropy and energy concepts are so close to each other, it was purposely called entropy by Clausius. That is why the first leg of the tripod was constituted by "en(ergy-tropy)" (energy–entropy) concepts. Since preservation and devaluation of the energy and the complicated relations between heat, temperature, and energy cause great confusion, an in-depth examination of these concepts is of utmost importance. Two of the thermodynamic variables are heat and work that witnessed the birth of entropy defined with the zeroth and first laws of thermodynamics. Clasius contemplated on the fact that *why couldn't the whole energy be converted into useful work*. As seen from the mathematical expression of $dU = \delta Q + \delta W$ the first law of thermodynamics, the internal energy is also given by these two concepts. That is why the first leg of the tripod approach was defined as Energy-Entropy "En(ergy-tropy)."

4.1.1.2. The Second Pod: Unavailability

One of the concepts located on the unavailability pod of the tripod approach is enthalpy. As seen from the Clausius non-quality ($dS \geq dQ/dT$) the macroscopic changes in entropy are associated with the change of the enthalpy of the system and the temperature of the medium (Thomas and Schwenz, 1998; Haglund and Jeppsson, 2014; Loverude, 2015). Also in the unavailability leg of the "*Tripod Approach*"*,* there are the macroscopic (thermodynamic)

concepts such as the second law of thermodynamics, which is used in the calculations of the change of energy due to the interaction of the system with its environment, Gibbs free energy, enthalpy, and exergy. Since the students found Gibbs free energy much more accessible, it is much better to start entropy education, revealing its relationship with Gibbs free energy (Geller et al., 2014). However, the change of Gibbs free energy should be introduced after the clarification of the entropic relations with other macroscopic properties because Gibbs free energy is a concept related to entropy, heat, work, temperature, and exergy concepts. According to Haglund(2016) Gibbs free energy is an easy way to define entropy where the enthalpic and entropy parts between the system and the medium are given in an integrated format. One other concept related to the entropy in the framework of unavailability is the exergy. According to Dincer and Cengel (2001), the change of the type of energy can only be understood by the exergy concept covering entropy and first and second laws of thermodynamics. It is believed that using an exergy concept would make the second law and entropy much more understandable (Jones and Dugan, 2003).

4.1.1.3. The Third Pod: Probability

The probability related third pod of the "*Tripod Approach*" is based upon the microscopic statistical approach in the framework of the probability of the Gibbs free energy and included the possible arrangement of the particles such as atoms and molecules, dispersal of energy, the third law of thermodynamics.

The starting point of the microscopic explanation of entropy for the newly acquainted people would be the arrangement of the particles and continue with the soft transition to the energy dispersal metaphor since some of the students have hard times to understand and evaluate this abstract molecular approach. In some studies which support this thesis that the degree of understanding of a concept is not related to how it is told but how the students evaluate it. In a study related to entropy with the students from various departments, chemistry students are much more successful in the molecular point of view, while the students coming from the physics department are much better in the macroscopic approach (Christensen and Rump, 2008; Haglund et al., 2015).

During the application stage of the tripod approach, based upon both the macroscopic (thermodynamic) and microscopic (statistical) analysis of entropy in the light of all the data obtained, it will be beneficial to take the following criteria into account:

The pre-knowledge of the students about thermodynamic concepts such as heat, energy, work, and temperature must be resurfaced in order to correct all misconceptions. Cotignola et al. (2002) and Erickson and Tiberghien (1985) reported that the students have intuitive ideas about heat and temperature, and most of the students could not distinguish heat, work, and internal energy. They also could not figure out why such a distinction should be made (Meltzer, 2004).

The perception of the energy concepts is a critical stage, and the students should adopt an approach either at the molecular stage or in mechanical energy format ($\Delta E_{system}=\Delta U+\Delta KE+\Delta PE$).

In a Ph.D. study concerning the difficulties encountered in the education of the thermodynamic laws (Pinto Casulleras, 1991), the students' incapacity to realize the similarities and differences between heat, temperature, and energy concepts were attributed to the fact that these concepts were not previously subjected to an in-depth analysis.

The education of the entropy concept must be started giving the quantitative macroscopic approaches top priority. In a Ph.D. thesis research (Cochran, 2005), it was reported that the students have problems understanding the basic thermodynamic concepts. That is why it is

recommended that the education of the thermodynamic concepts must be started from the macroscopic approach first (Baierlein, 1994; Loverude, 2002).

The students must perceive the relationships between entropy and other thermodynamic concepts using techniques such as mind maps (Figure 3).

4.1.1.4. The Mind Map of Entropy and Related Thermodynamic Concepts

We must remember that in the evaluation of the concepts, the students encounter in a science course is closely related to their perception of the terms indicating them (Haglund et al., 2016). Only under these conditions will the entropy concept mean something depending on the number of correct relationships with other thermodynamic concepts. On the other hand, it is a known fact that what the students mainly understand from the entropy concept is disorder. That is why there was a mind map established to improve their understanding of the entropy concept. (Figure 3).

As seen from Figure 3, the mind map developed is an integral part of the Tripod Approach and facilitates to establish much more meaningful relations between the thermodynamic concepts. Therefore, the education of these concepts is to be carried out in three distinct stages as follows:

1. **Stage:** Teaching the energy-based concepts related to the zeroth and first laws of thermodynamics.

2. **Stage:** Teaching the macroscopic concepts related to the change in the type of energy.

3. **Stage:** Teaching the probability-based microscopic approaches.
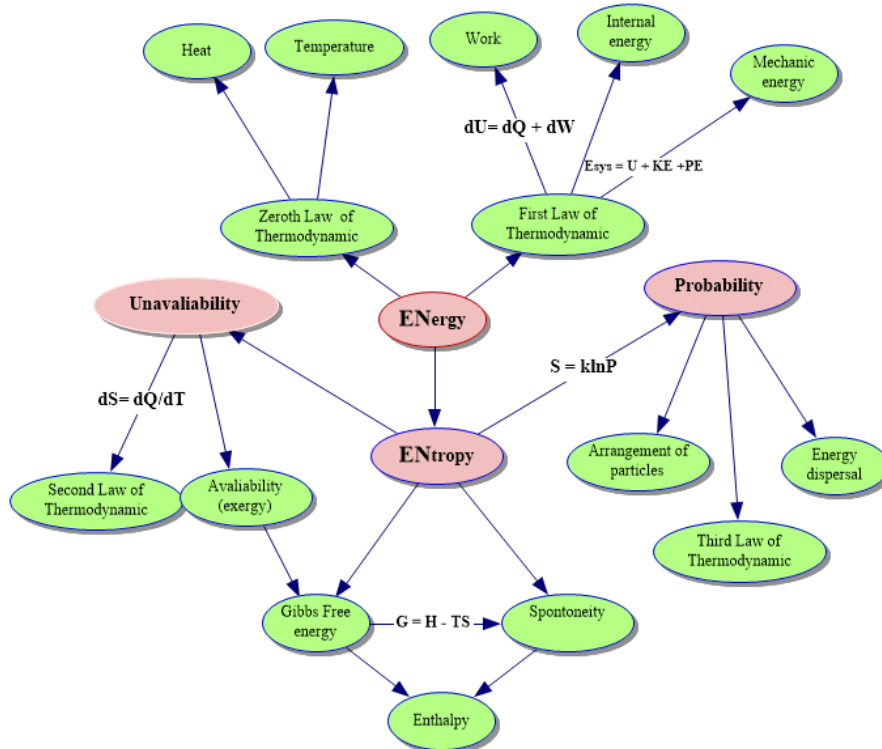

Figure: 3 *The mind map of entropy and related thermodynamic concepts*

We must mention that the tripod approach is the result of the need for macroscopic and microscopic focused integrated approaches for the explanation of the entropy concept.

4.2. An Alternative Definition to Entropy

The most significant difficulty in teaching entropy is the how-to integrate the macroscopic (thermodynamic) and microscopic (statistical) approaches to each other

Some opinions in the related literature are as follows:

• It is complicated for students to see how macroscopic quantities such as heat, temperature, enthalpy, or Gibbs free energy related to microstates and probability (Haglund et al., 2015, Haglund et al., 2016).

• It is quite difficult for students to see how much various aspects of entropy are related to a single physical quantity (Kozliak, 2004).

• Students need both basic microscopic understanding and the ability to solve phenomena-related problems on a macroscopic level, and the main difficulty lies in combining the two levels (Baierlein, 1994).

So far, there is no study to overcome this difficulty in the literature. Apart from that, leaving the macroscopic description of entropy, which goes back to Clausius and lack of relations between these two approaches of entropy, resulted in a dramatic increase of the studies based on microscopic explanations, which were thought to reflect the entropy in a much better way. However, this situation bears important risks for the understanding of the entropy concept (Baierlein, 1994; Haglund et al., 2010). For instance, in a study, it was reported that students were not capable of establishing any relation between entropy and macroscopic concept or problem-solving capacities and conceptional skills. Again, in the same study, the students predominantly related the entropy concept with the disorder concept. The least related thermodynamic concept was Gibbs free energy, followed by the second law of thermodynamic and enthalpy concepts (Haglund et al., 2016).

Leff (2012) claimed that entropy is an energy-related concept as seen in both Clausius algorithm ($dS=dQ_{rev}/T$) and Boltzman ($S=klnW$) formula and therefore, as was the case for disorder metaphor, the energy-independent descriptions would be an oversimplification of the entropy concept. In a similar approach, the heat and work are not the property of the system, and entropy and the second law of thermodynamics would be derived solely on an energy-dependent concept without touching heat and temperature (Barrow 1988).

The macroscopic state of a process is the statistical average of microscopic states. For instance, the macro variables of pressure and temperature are statistical average values. The relations between the microscopic structure and thermodynamic data are investigated under a new discipline called "Statistical Thermodynamics." Since it is not possible to observe the movement of the individual atoms, the values we use are practical average values (Çetinkaya, 1986). If we look at the same picture, the total entropy is made of two types of entropy, namely, thermal entropy measure of unusable energy and residual entropy due to the orientation of the molecules. Although both the residual and thermal entropy measures the uncertainty, they are different due to the type of uncertainty they measure. Residual entropy measures the uncertainty of the molecular arrangements, while the thermal entropy is related to the uncertainty of the energy and momentum of the particles (Popoviç, 2017). That is why if the statistical concepts are linked with the microscopic information of the atoms and molecules, it is possible to make statistical entropy or probability estimations about the microscopic world (Çetinkaya, 1986).

In conclusion, the fundamental mistake, which caused entangled problem ball of entropy rolling down to our time, was the insertion of the button to the wrong hole at the start, just as

case of "disorder." In this context, we will have made peace with the entropy concept, which has terrorized the scientific world for more than a century.

Based on the data obtained from this study, since all the processes take place in the universe with uncertainty in the energy dispersal and the type of energy, we can easily say that the metaphor which links the macroscopic (thermodynamic) and microscopic (statistical) nature of the entropy concept is "probability." That is why the entropy concept should be analyzed with an integrated approach by the use of probability and energy metaphors, which formed the essential components of the new description of energy.

In this context, entropy was described as **a "probable measure of unavailable energy or energy dispersal."** The differences between the newly proposed and current description of energy can be listed as follows:

- The entropy descriptions in the literature were predominantly based upon the microscopic approach, which is believed to reflect the content of the concept much better than the macroscopic approach, so the macroscopic part of it is usually ignored. However, in our alternative description, both approaches have been given adequate attention.

- Lambert (2006) stated that there are two critical concepts, namely energy, and probability, which is be stated in entropy changes. It is seen that while the concepts such as disorder, freedom, information theory are based upon the probability factor only, the alternative description contains both metaphors.

- The current descriptions explaining the entropy in energy and probability concepts are established according to the microscopic approach. Although microscopic and macroscopic approaches are a different component of the same root, the significant difficulty here is how to integrate them. The current descriptions are based upon the microscopic approach, and energy and probability concepts. In the alternative description, entropy is assumed to be dependent upon both macroscopic and microscopic approaches of the energy and probability concepts.

5. Conclusion

Scientists have brought so many explanations for the thermodynamic concepts, especially for the entropy concept. However, some of the approaches in the description of entropy caused the student to be puzzled. That is why the thermodynamic concepts, especially the entropy, were found to be complicated by most of the students. Although many press houses decided to remove the disorder concept from the new printed textbooks from 2013, some of the studies (Haglund et al., 2015) reported that the disorder is still the most popular concept. In the explanation of entropy, a highly abstract and mysterious concept, there were various metaphors developed in place of disorder (Leff, 1996; Styer, 2000; Lambert et.at, 2011). However, in most of these approaches, the macroscopic nature of entropy has been neglected. Because of this, there were so many problems encountered in the education stage of the entropy concept. In the face of the problems that occurred in entropy education, an entirely new education approach has been developed known as the "Tripod Approach."

The target of this "Tripod Approach" (Figure:2) is establishing an integrated outlook on the entropy concept. It is based upon both the thermodynamic (macroscopic) approach developed Clausius, Kelvin, and the probability (statistical) approach of Gibbs. Also, entropy and related concepts were illustrated on a mind map to determine the criteria of the education concepts to ameliorate the adverse opinion about it. Especially in-depth investigation of the energy concept, which plays a crucial role in the microscopic and macroscopic features of entropy, should be carried out.

On the other hand, since the description of the entropy was usually made on microscopic focused approaches, the macroscopic nature of entropy was neglected, and as a result, entropy was fixed in our brain as a complicated and vague concept. It was first realized by Bairlein (1994) and reported this problem prevailing in the scientific word. However, there were no studies to obviate or overcome this difficulty in the literature. Finally, with an undeniable contribution of the "Tripod Approach" system, integrated energy and probability-based description of entropy was developed. According to this study, entropy is described as **"Entropy is the probability measure of unavailable energy or energy dispersal."**

As a result of this study, we expect investigating the entropy concept in a much detailed manner, and the development of alternative education approaches will put an end to the turmoil existing in that area.

6. Conflict of Interest

The authors declare that there is no conflict of interest.

7. Ethics Committee Approval

The authors confirm that the study does not need ethics committee approval according to the research integrity rules in their country.

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