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CONTENT ANALYSES ON THE USE OF TECHNOLOGY IN DYSLEXIA: THE ARTICLES IN THE WEB OF SCIENCE DATA BASE

Research Article

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Abstract

Articles published in the Web of Science database between 2014 and 2019 (March) were screened in this research. This is because of its respected position in the field of technology and the peer-reviewed secured structure of this database. From a total of 56 articles within the scope of the screening, 46 articles were included in the study. As a result of this research, particularly children and students were selected as the sample group of the researches. It has emerged that questionnaires were predominantly used as the research instrument. Quantitative data collection tools were used most frequently as the means of data collection medicals area as the research fields through traditional teaching methods. It was observed that assistive technology is the most widely used field in technology for dyslexia. It is seen that optometric neuropsychological assessments, digital tools and adaptive mobile learning as devices were used the most in research. The lecture-based method is seen to be the most used teaching method in the present study.

Keywords: Technology, Dyslexia, Assistive Technology and Web of Science.

1. Introduction

The number of people with disabilities around the world is increasing exponentially, and the World Health Organisation (WHO) estimated that around 10% of the global population has been identified with some kind of disability. According to predictions for Europe, at least 18% of the population will have a disability during the next 20 years.

Custom curricula are focused on people with special needs, which incorporate learning difficulties, mental clutters, physical or formative capacities, and adopt learning strategies that are tailored to address individual students' needs.

In many nations, state primary schools pursue a strategy of incorporation, where children with special needs can study alongside different students (Maham & Gulnaz, 2019). According to the International Dyslexia Association (2002), dyslexia as a specific learning disability is a neurobiological disorder that comprises difficulties in learning, such as the accurate or fluent recognition of words, poor spelling, and problems in decoding information.

These difficulties are based on the phonological deficits within language and other consequences of this disorder include difficulty in comprehension while reading, and general difficulties in reading which can negatively impact the development of vocabulary and general background information.

Dyslexia is one such Specific learning disability (SpLD) that involves challenges with reading, and is the most common and widely researched learning disability.

Dyslexia is a neurological and lifetime condition that is often inherited. One out of ten people have some or the other traits of dyslexia and because of this, around 20% face difficulties in reading and writing. Appropriate guidance provided to students with dyslexia at an early age can drastically reduce the problems they face. Currently, available web page accessibility guidelines focus more on reading and writing, with inadequate attention for other aspects of online learning such as computer-mediated communication.

According to Gupta (2019), with massive strides in technology, a digital solution to this problem can prove to be more effective and efficient. Formative phonological dyslexia is a neuro-psychological confusion depicted as a difficulty in gaining reading abilities, in spite of satisfactory knowledge and sufficient perusing openings.

Dyslexia has a solid hereditary premise that is reflected in regions of the genome, primarily on chromosomes 6 and 18, which may contain inherited variations that cause reading inability (Leah & Heads, 2018). Learning is not limited to conventional classroom settings with the execution of web-based learning. Website page accessibility is one of the achievement factors for actualizing web-based learning, other than student's cooperation, the intelligence of a learning situation, content introduction and structure (Loren & Chen Jen, 2018). The neurological learning disability defined as Dyslexia is characterized by difficulties in various aspects of writing skills, making individuals unable to develop age-appropriate and ability-appropriate functional skills, there is also exist noticeable affordance and accessibility issues concerning the remedial help and assistive technology adoption (Tariq & Latif, 2016).

Dyslexia is one of the most common learning disabilities. It is described as a disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence, and sociocultural opportunities. It affects approximately 7–10 % of the population across most languages and cultures (Fatima Ezzahra, 2016).

Although dyslexia occurs independently of intelligence, it cannot be cured, which means the problem faced will continue to occur throughout the life span (British Dyslexia Association 2007).

1.1. Aim

The purpose of this study is to identify the trends in the articles related to the field of technology usage in dyslexia published in the Web of Science database between 2014 to March 2019. The results showed that most studies in the field of technology usage in dyslexia were carried out in 2018 according to the years. Most studies were published in the United States of America (USA), United Kingdom (UK), France and Spain. The reason for choosing this database was its open and easy access for users. Additionally, it is peer-reviewed and has a respected position in the academic environment. The additional objectives of this study are as follows

1. What is the number of publications by year of study?
2. What is the number of publications according to the countries?
3. How is the distribution of studies in terms of sample groups?
4. What research models were used?
5. Which teaching methods were used in the studies?
6. What data collections tools were used in the studies?

7. What is the research field?

1.2 Dyslexia

The word dyslexia comes from Greek words: “dys”, which means “difficulty”, and “lexis”, which refers to “language or words”. This is a type of learning disability, a language processing disorder, and this term is used when people have difficulties in learning to read and write, although it is not associated with a low level of intelligence. As research in this area has developed, there has been significant debate regarding the term itself, the definition and the criteria used to classify it. Dyslexia is a general term for disorders that involve difficulties in learning to read or interpret words, letters, and other symbols, but that does not affect general intelligence. Dyslexia is also known as a reading disorder and is characterized by trouble with reading despite normal intelligence. Different people are affected to varying degrees.

Dyslexia is a specific learning disability in terms of reading; children with dyslexia have trouble reading accurately and fluently and they may also have trouble with reading comprehension, spelling, and writing. According to the Oxford Advanced American Dictionary, dyslexia is a slight disorder of the brain that causes difficulty in reading and spelling, for example, but does not affect intelligence see related entries: Mental and emotional problems Word Origin. According to Tariq and Latif (2016), dyslexia is a learning disability that makes individuals unable to develop the age and ability, appropriate reading and writing skills often negatively affecting both their academic achievements and self-image.

According to Jenjekwa, Rutoro, and Runyowa (2013), dyslexia is any individuals with disabilities or are all learners with visual impairments including blindness, intellectual disabilities, hearing impairments including deafness, speech or language impairments, orthopedic impairments, traumatic brain injuries, health impairments, autism, emotional disturbances, and specific learning disabilities. Dyslexia is a disorder related to problems with the visual notation of speech and with alphabet writing systems that have phonetic construction (Siegel, 2006). Many definitions have emerged over time as a result of various research methods. However, one that has been widely accepted by the scientific community has been proposed by the World Federation of Neurology, in Cruz (2009), and by The International Dyslexia Association (2002), which defines dyslexia as a language learning disorder, regardless of the intellectual capacities of the dyslexic and that endures over time.

2. Methodology

2.1 Research method

This is a qualitative research study that uses the content analysis method. The aim is to determine and evaluate the usage of new technology in relation to dyslexia. The Web of Science database has been selected and the year limit has been set between 2014 to March 2019 for this research. The Keyword "Technology usage in Dyslexia" was written in the search engine during the scanning process. All the articles that contained "Technology in Dyslexia" as a keyword were included in this research.

2.2 Data Collection Tools

This involved the design of an Excel table using the following headings: Title, year, country, example group, research method, data collection method, working subject area, application tools used, devices used, method of teaching, and results are the classification for each journal as headings to analyse the journals on dyslexia.

2.3. Data Analysis

All the data were accumulated for each article in Microsoft word Excel package program formed according to content analysis criteria. Subsequently, the data reports were classified and frequencies were taken according to the stated criteria by using filter characteristics.

3. Findings

3.1. Distribution of Articles According to Publication Years

Table1. *Number of Articles According to Publication Years*

Year of publication	Frequency	Percentage %
2018	18	39.1
2019	08	17.4
2016	06	13.0
2014	06	13.0
2017	05	10.9
2015	03	6.5

As can be seen in Table 1, the highest number of research publications on technology usage in relation to dyslexia was in the year 2018 ($f=18$) and the lowest was in the year 2015 ($f=3$). Even though the research time of year 2019 is limited until March, the number of articles published in 2019 also has respectable results. Therefore it can be predicted that that the publication number will increase in 2019 after March. In addition, this result showed us that the number of articles will be increased by the year 2019 since March is one quarter of the year.

3.2. Distribution of Articles According to Countries

Table2. *Number of Articles According to Countries*

Countries	Frequency	Percentage%
USA	08	17.4
UK	05	10.9
Spain	04	8.7
France	04	8.7
Pakistan (Karachi)	03	6.5
Canada	03	6.5
China	02	4.3
Malaysia	02	4.3
Qatar	01	2.2
Norway	01	2.2
Morocco	01	2.2
Jamaica	01	2.2
India	01	2.2
Zimbabwe	01	2.2
Japanese	01	2.2
Brazil	01	2.2

Hongkong	01	2.2
Slovenia	01	2.2
Israel	01	2.2
Croatia	01	2.2
Italy	01	2.2
Czech Republic	01	2.2
Indonesia	01	2.2

As it can be seen in Table 2, the highest number of publications on Technology usage in Dyslexia was in the United States of America USA (f=08), the United Kingdom (UK) (f=05), Spain and France (f=04) and 16 other countries had less with (f=01).

3.3. Sample Group

Table 3. *Sample Groups of Articles*

Sample Groups	Frequency	Percentage%
Children	15	32.6
Students	13	28.3
Adults	05	10.9
Secondary school students	04	8.7
Teachers	02	4.3
Higher student	02	4.3
Learners	01	2.2
College students	01	2.2
Young people	01	2.2
Young adults	01	2.2
University students	01	2.2

According to Table 3, the most used sample group was children (f=15). Following this, the second highest sample group was students (f=13) and the third highest was adults (f=05). The lowest sample groups were five different groups (learners, college students, young people, young adults and university students (f=1).

3.4. Distribution of Articles According to Research Methods

Table 4. *Researching Method in Articles*

Research Methods	Frequency	Percentage%
Practical	06	37.5
Experimental	04	25.0
Student focused	03	18.8
Observation	02	12.5
discussion	01	6.2

The majority of the studies adopted Practical (f=06) research methods, as can be seen in Table 4. The second highest result was experimental (f=06), followed by

student focused (f=04) and as the other results included observation (f=02), discussion (f=01), which is the least.

3.5 Teaching Methods Used in the Articles

Table 5. *Teaching Methods Used in Articles*

Method of teaching	frequency	Percentage %
Traditional teaching method	07	36.8
e-learning	05	26.3
Mobile assisted learning	04	21.1
Problem-based learning □	02	10.5
Coaching	01	5.3

Traditional teaching method had the highest frequency (f=07) based on the studies in the articles, followed by e-learning with a frequency of (f=05), followed by mobile-assisted learning with a frequency of (f=04), while problem-based learning has a frequency of (f=02), and coaching, which has the lowest frequency in terms of the teaching methods used in the articles in this study.

3.6. Used Data Collecting Tools in Articles

Table 6. *Data Collecting Tools Used in Articles*

Data Collecting Tools	Frequency	Percentage%
Quantitative	21	60
Qualitative	11	31.4
Mixed (quantitative-qualitative) □	03	8.6

Most of the data collection tools of studies are seen to be quantitative (f=21) in Table 5. Following this, the second-highest result is seen as qualitative (f=11) and the least is the mixed method (quantitative and qualitative) (f=03).

3.7 Research Fields

Table 7. *Subject Fields of Articles*

Subject Areas	frequency	Percentage %
Medical	09	25.0
Information technology	09	25.0
Foreign language	07	19.4
Special education	05	13.9
Lifelong learning	04	11.1
Engineering	02	5.6

As can be seen in Table 7, medical and information technology used in various fields of education has the highest frequency (f=09), followed by foreign language

(f=07), special education (f=05), lifelong learning (f=04) and engineering (f=02) education.

8. Table of Results

s/no	Criterion	Subject Areas	Frequency	Percentage %
1	Year	2018	18	39.1
2	Country	USA	08	17.4
3	Sample Group	Children	15	32.6
4	Research Methods	Practical	06	37.5
5	Teaching method	Traditional teaching method	07	36.8
6	Data Collecting Tools	Quantitative	21	60
7	Research Fields	Medical	09	25.0

As can be seen in Table 8, among used articles publish in 2018 is the highest (f=18), among the most publish country is USA with (f=08) children are mostly preferred sample group for the study (f=15) through practical as research methods with (f=06), as teaching method is the traditional teaching method with (f=07), while quantitative data tools is the most used in the study (f=21), medical research fields is more useful with (f=09) in education.

4. Conclusion and Discussion

According to the investigation on the search engines including the years between 2014 and 2019 (March), it can be seen that a large number of studies have been conducted on technology usage in dyslexia; the year 2018 has the highest studies on dyslexia, most of the studies were conducted in the United States of America (USA) and they were carried out with children using quantitative method of data collection through questionnaires and traditional teaching methods. Most of the research fields are medicals and research method are through practical, Assistive technology interventions can be helpful for adolescents and adults with learning disabilities, but interventions need to be carefully compared and customized to the individuals. Assistive technology provides students with learning disabilities opportunities to perform better in academic environments. Technology can often provide assistance for these students in unique ways that help them overcome their learning difficulties. As technology becomes ubiquitous in the classroom, it is consistently transforming educational opportunities for students with learning disabilities (Dyslexia's). Strengths associated with dyslexia and argue that a shift in mindset from the deficit view toward the neurodiversity view is required to build the capacity of students with dyslexia to thrive in learning and life.

The findings here suggest that in future evolutions-using assistive technologies available today-parallel neurological pathways for language processing can be exploited to optimize reading for those impaired. The increased amount of time spent using electronic devices is associated with a higher risk of dyslexia and hard to evaluate due to recall bias (Adkins & Turman, 2018). This application which is called Disability Learning Tool, Brushing Teeth Using Music for Autism has been tested to a group of autism children with mild cases and has shown positive result. It can be seen that the independence of children with autism is gradually increased. Assistive technology Results support the phonological model, with phonological skills on the pathway to word reading and serve as a sensitive tool to measure changes in autism symptomatology. According to Loren and Chen Jen, (2018) assistive technology the incompetence of lecturers in inclusive education, lack of provision of handouts and notes prior to presentation of lectures, inflexibility in assignments and examination, focus on disabilities rather than abilities, and patronizing behavior are barriers preventing the participation of students with disabilities in learning. Furthermore, results show that large scale simulations with a developmentally plausible computational assistive technology model of reading acquisition allow us to predict learning outcomes for individuals either children, students, adults and university students reading profiles with dyslexia on the basis of performance. According to Adkins and Turman (2018), student academic growth for all three methods of coaching; however, coaching via technology, a more efficient, less time-consuming method of giving teachers ongoing professional development, produced larger statistically significant Cohen's d effect sizes than the other two forms of coaching ranging from 0.22 to 1.01 in areas of phonemic awareness, decoding, comprehension, fluency, writing, and spelling. Tariq (2016) have identified the trends took place in the field of educational technology educational implications of implementing coaching via technology are also included based on the analysis of the conversation among students and teachers to identify problems in the learning process and enhance the student's skills, with dyslexia compensated for their processing deficits by relying on learning strategies and help seeking. As the results demonstrated, the use of technology was shown suitable to their needs, allowing dyslexics to achieve similar results to regular readers.

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