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Analysis of Selahâttin Çoruh's Perspective on Interactive Methods Such as Games and Activities in Mathematics Education

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Abstract

Selâhattin Çoruh has contributed to the Turkish education system through his books and research. In this study, Selâhattin Çoruh's book "Arithmetic Teaching" was examined in terms of games, activities, and interactive methods. The study was based on examples of the book written by Selâhattin Çoruh, published at different times. To ensure that there was no loss of data in the content of the book under examination and to check the pages, three books dated 1945 and 1949 were found and their pages were checked. Document analysis was determined as the method for the study. The books were treated as documents, data was collected and analysed in line with the objective. It was concluded that Selâhattin Çoruh emphasised that using the game in mathematics lessons would create examples of real life for students and facilitate transfer to everyday life, and that he recommended the use of the game specifically in mathematics lessons. It was determined that Çoruh frequently used games and interactive methods as a type of reinforcement or for end-of-unit assessment. This book and its contents are recommended to be studied in relevant courses during university education, especially for prospective primary school teachers and mathematics teachers.

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INTRODUCTION

Selâhattin Çoruh was born in 1903 in the Hopa district of Artvin. In 1923, he was appointed as the "Head Teacher" at the Borçka First Boys' School. A graduate of the Darülmuallimin school, Çoruh served as the Ankara First Education Inspector. In 1943, he wrote a book entitled "Dramatisation in Schools". This work attracted a great deal of interest at the time. In the preface to the second edition of the book, Selâhattin Çoruh wrote: "Although the first edition of Dramatisation in Schools was an experiment, it was appreciated by the Ministry of National Education, aroused inter-

est among professionals, and led to the publication of appreciative articles in some professional journals (Çoruh, 1950: Foreword). He was then appointed to the Internal Publications Department of the General Directorate of Press, Publications and Tourism. Shortly afterwards, he worked as the Director of the Tourism Department. During this period, according to Yetgin (2018), following the "World War" that affected the entire world, he brought in resources from countries leading in tourism in order for Turkey to make a breakthrough in the field of tourism and catch up with European countries. He contributed to Turkey's significant progress in the field of tourism by utilising these resources. Selahattin Çoruh worked not only in the field of tourism but also in education. Dramatisation in Schools (1943 and 1950) and Teaching Arithmetic (1945 and 1949) are books directly related to education by Çoruh.

From the founding of the Republic to the present day, four main programmes have been implemented in primary education, excluding those that were drafts, in 1926, 1936, 1948 and 1968 (Arslan:2007). The book "Teaching Arithmetic", which is the subject of this research, was published in 1945. The second edition of the book was published in 1949. The second book appears to be more comprehensive than the first, incorporating the 1948 teaching programme. It is understood that the first book was written in accordance with the 1936 programme. This period coincided with the early years of the Republic, a time of significant educational reform.

The first programme in education and teaching was implemented in 1926, and the general outline goal was set as "Collective Teaching". This programme was based on John Dewey's concepts of "Life Knowledge, Collective Teaching and Work School" (Gülcü: 2018). The 1936 programme was developed during a period when reforms and innovations in education were beginning to take root. In 1936, the previous programme was reviewed and revised in line with the needs of the day. In this programme, the principles of "National Education" were included in the first section, entitled "The Objectives of Primary School". Subsequently, it focused on the "Principles of Primary School Education and Teaching" (Gözütok: 2003). With the 1936 programme, an attempt was made to free students from rote learning, and the aim was to create a programme that placed more emphasis on experimentation, observation and investigation (Gülcü: 2018). The 1936 education programme was seen as the first programme to fully reflect the views of the new regime and was implemented for twenty years, making it the longest-running education programme, as understood from the 1948 Primary School Programme (Sezgin Memnun: 2013). According to Çobanoğlu and Yıldırım (2021), it was the first programme to explicitly state the principles of education and teaching, paying particular attention to linking first and second stage courses. In the early years of the Republic, new programmes were shaped largely by taking old programmes into account, with the aim of structuring the education policy of a newly established state. Along the way, interim changes were also made from time to time. As part of these efforts, some changes were also made to the mathematics teaching programme.

In the first programmes, the subject corresponding to mathematics is referred to as "Hesap-Hendese" (Arithmetic-Geometry). This subject was first named "Aritmetik ve Geometri" (Arithmetic and Geometry) in the 1948 and 1968 programmes. In this respect, it is thought that the term used by Selâhattin Çoruh demonstrates how important his views were and how far ahead of his time they were.

Arithmetic is defined in the Turkish Mathematical Society's Dictionary of Mathematical Terms(2026) as " 1. Number theory, 2. The branch of mathematics dealing with addition, subtraction, multiplication, division, and exponentiation on the set of integers ". Based on this definition, considering that the most important desire of the period was to raise people who could be self-sufficient, arithmetic is thought to be very important, given its wide range of applications in social life. In arithmetic teaching, only the subject referred to as "exponentiation" was not covered among the operations defined above. It is also seen that the subject headings were addressed with examples frequently drawn from daily life. It is considered very understandable that the structure of the teaching programmes at that time was shaped according to the needs of the people and the requirements of development.

Regarding the topics mentioned in the 1926 and 1936 teaching programmes, the 1926 programme included: the four operations, numbers, naming geometric shapes, operations with fractions, graphs, tables, sets, problems, geometric drawings, and measuring instruments, while in 1936, these were supplemented with percentage and interest calculations, prisms and volume, and circle content (Deveci and Aykaç: 2020). The methods and techniques recommended to teachers by during the implementation of the objectives of the programmes developed during these years were defined as interdisciplinary work, from concrete to abstract, relevance to life, from near to far, learning by doing and experiencing, active participation, student-centredness, practice and exercises (Deveci and Aykaç: 2020). As can be seen, neither the methods and techniques provided nor the content mention games or interactive methods. Examples of these can be found in Selâhattin Çoruh's book "Teaching Arithmetic," which focuses on games and interactive activities. A review of the literature did not reveal any studies on his thoughts on this subject. Specifically, there are no studies related to this book. This study aims to investigate interactive methods such as games and activities in Selâhattin Çoruh's book "Teaching Arithmetic" and in the "Teaching Arithmetic" books (1945 and 1949 editions) and to reveal how such methods can be interpreted in terms of their relevance today.

Method

Model of the Study

The content of the book has been examined in line with the aforementioned purpose. In this study, the book has been approached through the document analysis method for educational science research. The fundamental problem in using this method is the issue of which documents are important and can be used as data sources. For example, in research related to education, the following types of documents can be used as data sources. In the field of education, these include textbooks, programme (curriculum) guidelines, internal and external correspondence, student records, meeting minutes, student counselling records and files, student and teacher handbooks, student coursework, lesson and unit plans, official documents related to education, etc. Depending on the research area, written press, periodic written sources, magazine journals and books can also be subject to document analysis, apart from personal information such as diaries, private letters and confessions. Although document analysis is defined in many ways, some definitions are as follows (Şimşek, 2009; Harvey, 2025; Şimşek, 2009). Document analysis is defined in the literature as follows.

- The document review method can be defined as the acquisition, review, questioning, and analysis of various documents that constitute the data set of the research, which are classified as primary or secondary sources (Özkan: 2023).
- Document review involves the analysis of written materials containing information about the phenomenon or phenomena being investigated (Şimşek and Yıldırım: 2016).

Data Collection Tools

Two editions of Çoruh's book "Arithmetic Teaching" were obtained for data collection purposes. As the book was published in 1945 and 1949, three copies of each edition were obtained and compared with each other to check that the book was not incomplete or incorrect. The check revealed that the books were consistent with each other.

Data Analysis

Words, sentences, and paragraphs were selected as the units of analysis in this study. The document was examined based on these units of analysis and their meanings found in the content. Since the book contained more numerical values than answers to questions, the data was evaluated in the context of meeting the defined questions, and a decision was reached.

Findings

Physical and Content Description of the Books

The book "Aritmetik Öğretimi" (Arithmetic Teaching) was first published in 1945 by AK-ÜN Printing House in Istanbul. The book consists of 100 pages. The book

measures 137 mm x 204 mm. There is no preface in the book. However, at the end of the book, there is a promotion for the book entitled "Dramatisation in Schools" written by Selahattin Çoruh. Then, on the last page, the contents of the aforementioned book are listed. The back cover of the book contains advertisements for the author's published and forthcoming books, including "Dramatisation in Schools" and "Sumerian Hero-Engidu," as well as the addresses of the places where they are sold. Finally, the back cover shares the price information for the book "Teaching Arithmetic."

The book, published in 1949, appears to have been published by İnkılap Kitabevi in Ankara. The book was printed at the Kenan Printing House in Istanbul. A "Foreword" dated "20/12/1948", which was not included in the 1945 edition, has been added to the first page of the book. This foreword states that the new edition of the book was prepared by Selahattin Çoruh with the encouragement of his friends and with some additions and changes following the implementation of the "1948 Primary School Programme". It is also stated that the reason for the publication of this book was that it was a graduation project for the Gazi Education Institute's Department of Pedagogy. Çoruh stated that the purpose of writing this project was based on his own field experience, namely that teachers needed an arithmetic teaching method that was easy to implement.

The contents section of the book is provided on the last pages of the book. This section is presented in the table 1.

As can be seen in the table, Çoruh has structured the content of the book with headings that highlight important points regarding the methods or topics for the easy teaching of the basic subjects found in arithmetic education. The book addresses arithmetic education under 16 headings and consists of a total of 98 pages. Looking at these headings, it is clear that Çoruh's aim is to provide teachers with methodological suggestions and to highlight the points they should pay attention to while practising their profession. While explaining all these headings, Çoruh uses the language of "I" or "we". Therefore, it can be considered that the content of the book is presented as if giving a seminar to a teacher, and its purpose is to show teachers which steps to follow when teaching the subjects to their students. While explaining these, Çoruh does not neglect to highlight the sensitive points of the subjects. In all subjects, the main points to be considered are first stated in the introduction, followed by recommendations.

In the 1949 edition, the contents section was expanded by one heading compared to the 1945 edition, with the addition of a preface heading, bringing the total to 17 headings. The number of pages in the book also increased to 104. Another notable innovation in the book is that the subject headings have been transformed from sentences into

Table 1: Table of contents of the book (1945)

1945 Edition Book Page (Page)	Title
3	The ideals and principles of arithmetic and geometry lessons.
4	Examples of using movement and games in arithmetic instruction.
18	Points to consider when teaching numbers and writing digits in the first grade.
23	Teaching numerals, introducing the concept of place value, practising writing large numbers.
26	Tools and activities for understanding the concept of place value.
29	Writing and reading large numbers.
33	Some simplifications in teaching the four basic operations.
42	Some simplifications in teaching decimal fractions.
64	Some simplifications in teaching common fractions.
74	How problems should be structured.
76	Some simplifications in teaching measurements.
86	Some simplifications in teaching graphs.
90	Percentage calculations.
91	Some simplifications in proportion calculations.
94	Interest calculations.
96	Household calculations

comprehensive headings representing the topics. There is no noticeable difference between the front and back covers.

The location of the bibliography section has not changed, but additions have been made. Çoruh mentions seven different bibliographies that he used while writing the 1945 edition of the book. These sources consist of various books and journals. The bibliography is tabulated as follows. The book, published in 1949, includes the 1948 teaching programme that came into effect at that time.

Table 2: Table of contents of the book (1949)

1945 Edition Book Page (Page)	Title
III	Foreword
1	The ideals and principles of arithmetic lessons
8	Movement and Play in Arithmetic Instruction
14	First grade: counting numbers, writing numbers
20	Teaching numbers, the concept of sets
23	Understanding the concept of sets
26	Writing and reading large numbers
30	Notes on the four operations
39	Some conveniences in teaching decimal fractions
61	Some simplifications in teaching common fractions
76	How problems should be structured
78	Some simplifications in teaching measurements
88	Some simplifications in teaching graphs
92	Some simplifications in teaching ratios
98	Percentage calculations
99	Interest calculations
102	Household accounts

One of the first works that stands out in the bibliography is the 1933 book by Erika Bebie Wintsch, titled "The Principle of Movement in Education and Teaching." Research has determined that this book was published as part of the Zurich Special Education Seminar. Another noteworthy source and individual is the lecture notes by the educator and writer Fuat Baymur. Another characteristic of Fuat Baymur is that, like Çoruh, he authored works such as New Arithmetic Lessons for Children of the Republic (1936), New Geometry Lessons for Children of the Republic (1936), New Arithmetic Lessons for Children of the Republic (1938), Geometry Teaching (1943), and New Mathematics Lessons Class V (1955). In this regard, it is very clear that Fuat Baymur inspired Selahattin Çoruh. Apart from these accessible sources, it has not been possible to obtain the publications of the American magazine operating under the name "Progressive Education" at that time. However, the fact that the bibliography consists of different languages also seems to confirm Çoruh's identity as a researcher.

Based solely on the subject headings, it can be observed that the author's aim was particularly to make numbers and operations with numbers practical and accurate. The extent to which this is appropriate for the field of arithmetic is also evident. The preface of the 1949 edition expresses this, and the inclusion of the programme, which came into effect in 1948,

Table 3. Bibliography section of the books

Bibliography Title	Publisher / Author Name
Primary School Curriculum	Ministry of Culture 1936
Arithmetic	Ministry of Culture 1938
Primary Education Gazette, various issues	Ministry of Education
G.T. Institute, Department of Pedagogy, lecture notes	Fuat Baymur
Movement as a Teaching Aid	Erika Bebie Wintsch
Progressive Education	American Journal
Dramatisation in Schools	Selahattin Çoruh
Primary school programme	*Ministry of National Education 1948 (book published in 1949)*

in the book seems to have increased its functionality. It is also evident that it filled a significant gap in the field. All subject headings will be examined separately due to the examination of the content. When looking at the headings in order, since the "Preface" was first written in 1949, no heading has been added to this section again. Following these sections, the findings obtained from the book are presented below based on the headings in the book.

The Ideals and Principles of Arithmetic and Geometry Lessons

Çoruh notes that the rigid, abstract, and inappropriate teaching of geometry and arithmetic in the 1936 curriculum instilled fear in children. To overcome this problem, he argues that these subjects should be taught using different methods and with specific objectives in mind. In this context, the objectives of these subjects in the 1936 curriculum are as follows:

a) To enable children to construct the concept of numbers in their minds, to develop their mathematical abilities, and to equip them with the calculation knowledge and skills they will need in daily life.
b) It is described as training pupils to express different areas of life, particularly topics related to economics, in numerical terms and to perform calculations on these topics.

In the second edition of the book, published in 1949, these principles were updated based on the general objectives of the arithmetic course in the newly adopted 1948 primary school curriculum, and the following revised objectives were listed.

1- To impart to the child the concepts of numbers and operations;
2- To develop the child's ability to apply their arithmetic knowledge to real-life situations;
3- To instil in the child the habit of using arithmetic language;
4- Ensure accuracy and speed in operations;
5- To develop in the child the habit of analysing problems and situations encountered in all areas of life in terms of quantity;
6- Ensuring accuracy in attitude, thinking and reasoning in terms of effort and time;
7- To make mathematics a method of thinking that enables the child to solve problems encountered in their daily life.

Çoruh emphasizes that topics should be linked to daily life rather than relying on abstract teaching methods that are unsuitable for children. To address this abstract approach and guide all lessons, he outlines the following four fundamental principles:

1) The Principle of Work: This means carrying out work aimed at specific goals using a set of concrete tools. The aim is to remove children from their former position as spectators in the classroom and turn them into active and creative individuals in the classroom. This means engaging their various senses—their hands, eyes, ears, mouth, and whole body—to remove them from being spectators and involve them in the work, making them active.
2) Child-Centredness or Starting from the Child: The important perspective is defined as accepting that children are not miniature versions of adults and remembering that they are unique beings. It means not forgetting that students come to the classroom with some knowledge and that the teacher must act accordingly.
3) The Principle of Collective Teaching: In modern Turkish, this principle can be called the interdisciplinary (collective) teaching principle. Two basic rules must always be taken into account in the teaching of mathematics and geometry. The first is to impart the technical skills specific to the structure of these subjects; the other is the role of these subjects as a means of expression. Although these subjects have lost their independence and become an active part of this holistic structure according to the interdisciplinary teaching approach, it is not correct to view them solely as 'instrumental subjects' (means of expression) because they have their own unique structure.
4) Principle of Movement and Play: Even though children are very young, they are actually living (dynamic/active) personalities. They are constantly interacting with the outside world through their movements. The natural state of the body also requires movement. Doctors emphasise that it is

> unhealthy for children to be active and sit still in rows for hours, as they do in classrooms. However, the majority of teachers conduct their lessons in a manner contrary to the principle of movement, play and activity. Teachers expect this type of student behaviour. But those who do not conform are labelled as disruptive, impatient, inattentive, irritable, lazy, incompetent, ill-mannered, quarrelsome, and disloyal. If the principle of movement and play is not followed, these student profiles will increase. Play is the most natural tool, path, and concrete manifestation of strengthening and development. Although they may not seem related at first glance, play is a motivating factor for activity and movement. Play involves imagination and creativity (fantasy). In academic work, especially in arithmetic, there is an almost palpable abstraction. It is stated that play offers educators opportunities to deeply integrate it into our culture and work discipline.

Çoruh formulated the above statements from a very broad perspective for his time. The fact that he wrote such accurate observations about students and advice for teachers at that time shows that he was also very knowledgeable about education. The first and fourth points in particular seem to point to the subject of this study, namely play and interactive methods.

Regarding his understanding of play, Çoruh stated: "We should not approach play in the narrow sense (as a means of entertainment) as we understand it. We should evaluate it in the sense that it facilitates the development of fundamental powers and enhances creativity/construction skills. Children prefer lively and dynamic examples. Play is important for the development and flourishing of human existence."

Similarly, regarding the benefits of play, he expressed the view that: "Some students lack self-confidence. Every failure awakens a feeling of worthlessness in the child; it exhausts them in the face of struggle and makes them 'school-weary'. Especially in mathematics, where very abstract things are demanded of the child, indifference (apathy) towards the subject emerges with full force."

Çoruh (1949) expressed the following thoughts on education: «This is why we must also make room for movement, play and active participation (activity) in teaching. We must eliminate the abstractness, dryness and structure of mathematics teaching that leaves the student passive with this method (through play and movement).»

When evaluating the views listed above, it is observed that they view play as a method and, at the same time, as a discipline, through the same lens as creative drama. However, there is one point of divergence. Çoruh expresses this point as follows: When asked, "Should we apply the principle of movement and play to all classes?", he states his opinion as follows: "We will say no to this. We will gradually abandon movement and play as the classes advance. We will not blindly adhere to it, for this is harmful." This section is expressed in slightly softer language in the 1949 edition. Çoruh included this view in the 1949 edition in one of the newly added sections, 'Primary School Programme'. In this section, he explained how concrete arithmetic is in the child's real world through comparisons of money, objects around them, shapes, distance, time, weight and direction. He made a statement indicating that such examples should serve as a guide in lessons. Here, it is argued that play and movement will prevent lessons from becoming dull in arithmetic teaching and prevent a situation where students are passive and the teacher is active. Again in this section, as in the 1945 edition, he recommends the use of games in the early grades. In this section, Çoruh recommends the use of games for the grades, stating, "It is certainly not always possible to teach according to the principle of movement and play in all grades. Movements and games, which we will use frequently in the early stages and in the first grades, may give way to purposeful activities as the grades progress, so the use of games in teaching should be applied more in the first grades (Çoruh, 1949, p.7). No data could be obtained from the book regarding the softening of this assessment, which was made without any certainty.

Çoruh's program aims to help students develop practical solutions using examples from their own lives, and to build self-confidence and a sense of group belonging through play and movement. The fact that this approach aligns so closely with the

Turkey Century Education Model (TCEM)—which will be approved in 2024 and implemented in 2025—is the clearest proof of just how far ahead of his time Çoruh was as an educator. The goals that modern education strives to achieve today—such as making lessons interactive, connecting mathematics to daily life, and using educational games and interdisciplinary concrete models—were already established by Çoruh decades ago.

While TCEM offers a more detailed framework based on today's accumulated knowledge, Çoruh holds an undisputed pioneering position among his contemporaries thanks to the innovative vision he brought to arithmetic instruction. By stepping outside the prevalent, abstract, and rule-based educational mindset of his time, he argued that knowledge can only be interpreted when applied in real life. The fact that Çoruh did not leave these interactive methods as mere theoretical recommendations but enriched his book with concrete real-life examples clearly demonstrates how far he surpassed the standard educational understanding of his time and why his work holds such unique value.

Examples of Working with Movement and Games in Arithmetic Teaching

In this section, Çoruh bases the role of movement in both education and arithmetic teaching on a three-stage process. The first stage is to penetrate (understanding by seeing and experiencing), the second stage is to open a psychological path to moving on to doing, and the third stage is to evaluate (transfer to life). In 1949, this part was addressed in two stages. These were expressed as absorbing by seeing and experiencing, and appreciating (making it part of the child's life). In this edition, the second point appears to have been incorporated into the third.

Çoruh›s explanations in this section of the book are as follows. When explaining the first stage, just as in arithmetic, it is not very useful to show only the number of something and only the object itself. The child must use all their senses. Therefore, if necessary, the object should be placed in the child›s hand, and the child should engage with it. Here, it is seen that what Çoruh really meant was that he prioritised the formation of lasting concepts in the student›s mind through movement. He stated that the hands, arms, and feet could be important learning tools for doing this. In addition, he stated that other tools that enable learning through seeing and experiencing include musical instruments, keeping rhythm, coins, grains, fruits, school and household items, etc., blackboards, classroom flooring, gymnasium ropes, two-coloured round cardboard pieces, etc. Up to this point, Çoruh appears to support the idea that visual-spatial intelligence helps ensure that students› learning is permanent for the development of numerical intelligence.

When referring to the second stage, it is thought that as a result of the first stage, students will be enthusiastic about learning subjects such as arithmetic as a result of activities that they have grasped with their own bodies and used their entire organism.

In the third stage, Çoruh complains about the meaningless value often given to useless information, even in upper grades. In this section, Çoruh (1949) reinforces this with a supporting statement from Pestalozzi: "The most terrible legacy left by an enemy genius is knowledge that has no practical application." He emphasises that anything that has no practical application in life is worthless. Based on all this, it is emphasised that play is the element most suited to the nature of the child and plays the most valuable role. It is also emphasised that play will be effective in transferring knowledge to life. Here, it is stressed that when pupils first start primary school, they are confined to a limited area, and it is underlined that play can help them overcome this fear and tension and adapt to school.

Again, this section emphasises that play is an essential requirement, particularly in the first years of school, during the first lessons, and especially in arithmetic lessons. It stresses the importance of teachers adapting their lesson content to include local games. Examples of such games (Çoruh, 1945) are listed below.

Learning Outcome: Understanding the concepts of many, few, always, and never.

Location: Garden or playground

Game Name: Black Man (Physical Education in Primary School- İlyas Sınal)

The playing field is rectangular. One of the children (the black man) or the catcher stands at one of the goals. The other children stand at the opposite goal. When asked, "Who is afraid of the black man?", the children answer in unison, "No one." At the sound of a whistle, all players run towards the opposite goal. Meanwhile, the black man tries to hit the players. Those who are hit join the black man and try to hit the other children.

"The game should be paused occasionally (saying 'too many hits', 'always caught', 'almost gone', 'none left') to introduce and teach the children the concepts of ' ' (Çoruh:1945)."

Learning Outcome: Understanding numbers from one to ten

Game Name: Train Game

The children stand in a line on the playing field. If there are too many, they are divided into two groups. The children in the first group line up one behind the other. The two children at the front become the locomotive and hold two sticks parallel to the ground in their hands. The others stand in two rows facing each other, hold hands, and raise their arms to form a tunnel. Several station signs are placed at various points on the field and named. The first two children in the train line walk, pretending to be the locomotive with the sticks in their hands, pass through the tunnel, and stop at the stations. At the stations, the teacher says: "Three carriages separate, five carriages separate." The child who is the "conductor" separates that many friends from the end, and a song is sung while this is being done. If a mistake is made, the song is stopped. The game continues in this way.

Learning Outcome: Understanding numbers from one to ten

Game Name: Camel Caravan Game

This is a game where the children who have formed a line and become a train are told by the other children, who are the merchants, to separate into groups of one camel, five camels, three camels, etc. It is played just like the train game.

Learning Outcome: Understanding numbers from one to ten

Game Name: Pigeon's Nest Game

The children form a circle, holding hands. At one point in this circle, two children do not hold hands. This is considered the door.

The midwife stands in the middle. A few children gather around her like pigeons. The child in the middle says, "Four pigeons come out," and calls out the children's names. They mimic pigeons and fly out the door. The child in the middle waits a moment. Then he shouts, "Hurry up, come back before I count to three, the doors are closing!" He counts one, two, three. The pigeons run back to their places; whoever is late joins the circle.

Learning Outcome: Understanding numbers from one to ten

Game Name: 2 3 4 Games to teach counting (counting means other numbers and has the same meaning as etc.)

The children are grouped in twos, threes, fours, fives, and sixes according to the number to be taught. They are scattered according to the number of gong or bell strikes; for example, if there are two strikes, they scatter in twos, if there are three strikes, they scatter in threes. The gong or signal is given again, and they gather. Groups that do not perform well are eliminated from the game, and the winners are distinguished.

Learning Outcome: Understanding numbers from one to ten

Game Name: Post Game

The children form a circle and each is given a number from one to twenty. One child walks around the circle. Any sound-producing object, such as a bell or whistle, is used to signal the music:

Ring ring ring ring
The post has arrived from Istanbul
Ring ring ring ring
One, two, five, twelve
Let the postman pass by here

It is said. Those who have received these numbers line up next to the person saying them. Whoever gets confused loses the game.

Learning Outcome: Understanding numbers from one to ten

Game Name: Increasing and decreasing in twos and threes

The children either form a circle or line up. A spot is marked on the ground with chalk. Each child is given a number. They are paired up and grouped. When two signals are given with a school bell or whistle, the children run in pairs, one after the other. The second group runs in fours, then sixes, and so on. They line up one after the other, shouting "îlah."

The decrease is done in the same way; for example, the last numbers are 20, 18, 16, and they run and shout in order.

Learning Outcome: Understanding numbers from one to ten

Game Name: Games designed to understand numbers

Plates with pictures of apple trees and birds are hung on each child's chest. These plates have pictures made according to the number to be taught. The teacher or administrator shouts: "Threes." Those with the three plates run quickly. Whoever runs to the teacher first is considered the winner (Çoruh: 1945).

It is very valuable that Çoruh states that the best way to transfer the elements of play and arithmetic into life is through play, which is the most suitable and valuable element for the child's nature during this period. Although there are many types of games known today, conveying this in a way that could be recommended at that time shows that Çoruh had tried or implemented deep thoughts about education. Although most of these games are characterised by being activities where the fastest wins or the most knowledgeable gains the most, it is thought that they would increase student motivation at that time. Another important point to note here is that the book also recommends to its users the unspoken (implicit) benefit of play, which is its unifying aspect. This brings to mind that Çoruh's search for education could be in many different areas. During this period, it is particularly striking that Çoruh used games and interactive methods more as reinforcement activities, which was a forward-thinking approach at the time.

Points to Consider When Teaching Numbers and Writing Numerals in the first Grade

In this section, Çoruh states that he has identified the mistakes teachers make in teaching numbers and numerals as: approaching the teaching programme item by item, as in other subjects; teaching children to write numbers quickly and then moving on to written arithmetic; and making children do calculations without considering their visual comprehension.

As a result of his observations, he states that children may become bored and disengaged from the subject, or even develop a fear of it, because teachers fill the entire lesson with arithmetic. In his book, he expressed his opinion as follows: "Those who harbour a lifelong hatred of mathematics have fallen victim to the teachers' erroneous, irregular, and ignorant actions and practices from day one (Çoruh, 1945)." To prevent this situation, he offers the following solution in his book: "Meanwhile, by incorporating music, games, drawing, conversation, stories, and reading into the lesson, the goal can always be achieved, and in this way, interest and attention can be maintained (Çoruh, 1945)." Here, in line with the research objective, Çoruh emphasises the importance of using interactive methods. It is also evident that Çoruh recognised the positive impact of games and interactive methods on developing positive attitudes and explained this to teachers.

In this section, Çoruh introduces the topic with an explanation that it is important to accept that some first-grade students can count numbers in the correct order ( ) or perform operations, and that identifying these students is important. He states that the reason for this is that children achieve this through auditory means and games. He emphasises that two stages are important in the formation of number teaching: the first is for the child to learn to express numerically what the number represents when they see a concrete object, and the second is to form a number sequence. The concept of number sequences here can be thought of as counting or writing rhythmic numbers in place for first graders. In doing so, it was accepted that there are two situations with profound differences for children. The first is counting objects, and the second is counting by rote. The first is difficult for children.

Çoruh gives four different types of counting methods in this section.

Counting by separating objects: This should be the first counting method for school-age children. It is emphasised that this counting method should be practised from day one.

An example of this counting method would be to place 10 apples and a basket on the table in the classroom and ask the student to take each apple they count and place it in the basket. This will also gradually introduce the student to matching.

2- **Counting by touch:** This comes after the stage of counting by separation. It may emerge when the child no longer needs to count by separation. Shepherds count their sheep by touching them with their sticks.

Using the same example for this counting method, it involves counting by touching only the top surfaces of the apples with a finger or hand and following a sequence with the eyes.

3- Counting by pointing at objects: The student moves on to this type of counting once they have reached a certain level of maturity. This is likely to be achieved at the end of the first year or the beginning of the second year.

1- **Counting in groups:** This involves the pupil counting in groups of two, three, etc. It is not appropriate to introduce this at an early stage. It is an activity that helps children easily grasp arithmetic concepts.

In this type of counting, students are asked to separate apples into groups of two or three while counting them.

Çoruh states that various natural and symbolic tools can be used when teaching counting. Çoruh has expressed the view that these should be used in a specific order. These include the child›s organs or fingers, school supplies, objects in the school garden, beans, tokens, stamps, coins, rubbish, abacuses, tens and hundreds boards, metres, clock faces, stones, marbles, and other shapes and pictures, arranged in a sequence that allows the child to easily move from their body to the outside world through objects. In doing so, Çoruh emphasised the importance of applying games, objects, and movement.

"Just as we teach a child to read and write for the first time by taking the words they know and use, talking about them, and then writing them down, we should teach numbers in the same way after they have grasped the concept of counting (Çoruh, 1949)." Çoruh emphasised that teaching numbers should only be done after the above-mentioned step has been achieved. In addition, he claimed that once number awareness has been established, the interdisciplinary subject of Life Skills can be easily learned. However, it was stressed that it would not be correct to direct the content of all lessons towards teaching numbers while doing this. In making this point, Çoruh categorises the ages at which numbers are understood, arguing that the number 1 can be understood at two and a half years old, the number 2 at three, the number 3 at four, and the number 4 at five.

It is emphasised that it is the teacher's duty not to frighten the child and to ensure that they enjoy the lesson, and that this can be achieved by teaching the lessons through games, music, pictures, conversation and stories. In this section, Çoruh particularly believes that it is very valuable for children to use things such as music, games, conversation and stories when forming the concept of numbers. Furthermore, his recommendation to teach the values of numbers starting from the child's body and spreading out to the environment suggests that Çoruh also developed ideas to ensure the permanence of learning. For teaching numbers, it is recommended to start with patterns formed by objects, then move on to writing numbers, followed by writing numbers on a number line, and then teaching them in twos, threes, fours, etc. The teaching steps that should be adopted when teaching children, from simple to complex and from near to far, are more visible in Çoruh's book. In addition, both today and in Çoruh's book, teaching through rhythm alongside play is emphasised. In this respect, it is seen that he emphasised the use of play or interactive methods. While many examples in today's textbooks are prepared without attention to context, the fact that Çoruh recognised and addressed this issue at that time shows that he also paid attention to misconceptions and wanted to prevent incorrect learning.

Teaching Numbers, Conveying the Concept of Support, Writing Large Numbers

In this section, Çoruh states that since numbers are matched with objects, they are three-dimensional for them, and that it is necessary to first convert them into two dimensions and then into symbols, shapes, lines, and numbers to represent this with symbols. He gives the following Figure 1 (Çoruh, 1945) as an example in this regard.

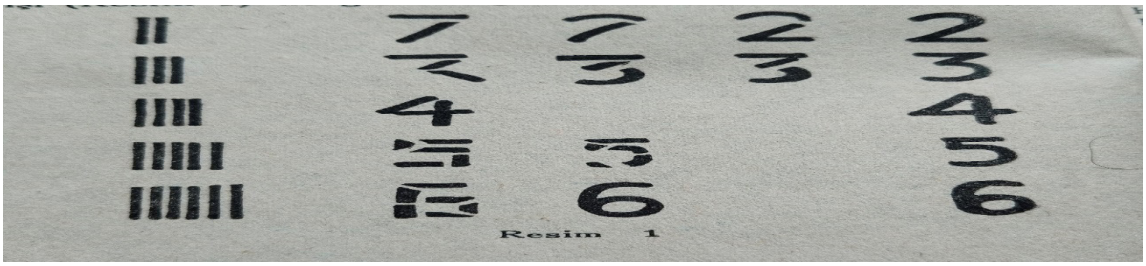

Fig. 1: Number teaching

As seen in the picture, two straight vertical lines were first used to teach the number 2. It can be assumed that these are sticks or rods, which are among the materials Çoruh recommends for use in lessons. For example, a representation created using two sticks is shown in the photograph above. With some adjustments made to teach the actual representation of the number, the steps towards the actual representation of the number are taken gradually. First, an attempt was made to create two using sticks, and then the teacher was asked to create the steps of the number's formation in a way that would show the proper form of two. What is noteworthy here is that the formation of the number 7 is not shown, or that the examples stop at the number 6. It is thought that the reason for this may be that the representation of the numbers 7 and 2 could be the same, or that there may be an excess of sticks obtained with the number 7. This situation suggests that Çoruh also paid attention to conceptual misconceptions. Furthermore, in his book, he himself mentions that not all numbers should be given at once. He states that it would be useful for interdisciplinary studies to demonstrate how these numbers are written using strings in "art and craft" lessons.

Within the scope of mathematics and arithmetic education, which was just beginning to be structured at that time, it can be seen that such teaching actually aimed at achieving lasting gains. In this respect, having students first create numbers in this way is a valuable approach. The use of inexpensive materials that anyone can easily find for the work expected to be done to form the concept of numbers in their minds while teaching numbers is also very valuable in terms of equal opportunity. As mentioned above, the coding of the formation of numbers within the study and the creation of something with what is available, as well as the formation of numbers, is directly related to their ordering due to their multiplicity. In this sense, it can be said that this study is an effective method.

Understanding the Concept of a Deck

Under the heading of understanding the concept of a deck, Çoruh argues that the concept of a "deck" is very valuable for learning large numbers and that it is a subject that supports the basis of number teaching, referred to as division in today's mathematics. Therefore, this subject is accepted as the first step in teaching large numbers. In this section, Çoruh states that all arithmetic operations are based on sets. In doing so, he emphasises the value of understanding the concept of sets. He mentions the importance of doing this and the importance of doing so in an interdisciplinary manner. He emphasises that what is important here is not to prepare children for secondary school level by practising and solving problems based on their cognitive readiness, but rather the principle of calculation based on the rapid four operations, formerly referred to as the "black sentence".

Tools and Activities for Teaching The Concept of Place Value

As tools and activities for understanding the concept of sets, Çoruh primarily recom0mends using children's hands and feet, objects they use for play, and objects found in their immediate surroundings. In addition, he recommends using games as tools through certain exercises such as making and breaking sets, placing them in bags and boxes, and tying sets. He emphasises that these are tools and equipment that students should always carry with them. As an example of a game, he cites the following game, which he calls "red-white".

Red-White Game (Deck Concept)

Two goal lines are drawn in the playground. One goal is the stacking goal, the other is the dismantling goal. The teacher or supervisor stops the stacking groups in turn on this line. Any numbered child is designated as the catcher. For example: "We will break the stack by hopping or putting our hands behind our heads" is announced. A command is given from one to five or from two to eight. The children run towards the opposite goal. When each group's catcher reaches the goal line and completes the count, they shout. For example: "Four came, six came, five came, five left..."

Those who put their feet down while skipping or let go of their hands behind their necks are eliminated from the game. If there are fewer people in a group than the number called out, those who said the wrong number are penalised. These groups are considered to have lost. Making them count again and find their mistakes reinforces the concept of the group.

New situations are also reviewed with commands such as "break the group" or "run to the groups" (Çoruh:1945,26-27).

Although this section recommends all of these, for arithmetic, it is money that is considered to be both from daily life and close to the child's life. In this way, it is emphasised that, in addition to breaking and making decks, the concept of holding can also be taught. Çoruh emphasises that the priority in first grade is to use two decks up to the number 20. When evaluated within the scope of this research, it is seen that Çoruh encourages the use of the game as a type of reinforcement and peer learning.

Writing and Reading Large Number

Çoruh, noting that learning is based on interest and need, suggests teaching mathematics using everyday materials such as lottery tickets or large numbers found in newspaper articles. To help students quickly grasp the concept of place value (tens, hundreds, thousands), he recommends conducting interactive shopping simulations in the classroom using play money, cardboard piggy banks, and cash register compartments. He argues that these gamified processes are extremely effective in teaching division, place value, and decimals by making these concepts concrete.

Çoruh's vision demonstrates how far ahead of his contemporaries he was in two key ways: First, the "cashier's calculation chart" he designed at that time is the direct precursor to the decimal base blocks (ones, tens, hundreds) used in today's modern textbooks. Second, the shopping scenarios he devised for the classroom represent a successful application of today's modern "drama in education" method, developed decades in advance. His ability to transform abstract concepts into such concrete and enjoyable experiences once again highlights Çoruh's pioneering and valuable position in the history of education.

Çoruh transformed mathematics from a feared, abstract, and dry set of rules; he rebuilt it using the tools most suited to a child's nature—play, movement, and scenes drawn directly from real life (shopping, newspapers, money). This philosophy, which liberates the student from being a passive recipient and transforms them into an active participant, aims to fundamentally resolve the "school burnout" caused by failure.

Some Conveniences in Teaching The Four Operations

Çoruh believes that teaching numbers and the concept of groups is the best aid and perhaps the foundation for addition and subtraction. He accepted that while these are being done, through play and movement, and also through work with objects, the rules of addition and subtraction will become natural, and therefore, lasting learning will occur. In the example related to storytelling, Çoruh describes a story that takes place in nine different settings. The initial illustration features a cat. Beginning with a cat playing with a shoe, this process unfolds across various settings—each containing a different number of objects—where dramatic scenarios can be created as the number of cats increases, offering moments suitable for crafting diverse stories. In each drawn frame, the number of cats has increased, and the first cat drawn is depicted joining the others. This scenario appeals to both the child's imagination and mathematical understanding. This activity in the book also serves as an excellent example of number instruction and addition and subtraction operations.In the Turkey Century

Education Model (TCEM) textbook taught in the 1st grade today, there are examples in the books using pictures of bread counts, walnut counts, and egg counts as examples close to children's lives. Although it differs from Çoruh's book in terms of teaching principles, the textbooks provide examples based on teaching with two hands, thus establishing context by giving examples later on, as Çoruh wanted, rather than adding and subtracting from the very beginning using one's own body. In this respect, it can be seen that Çoruh's views are still relevant today.

It has been stated that multiplication is a shortcut to addition, and therefore it is important that classroom activities are carried out with this in mind. It has been emphasised that the important criterion here is for children to learn the multiplication table without memorising it, using small numbers and objects around them. In this regard, it has been underlined that the examples found in textbooks and given by teachers are confusing and quite difficult for arithmetic teaching. Çoruh considers the multiplication table important for arithmetic teaching. However, he attaches importance to its visualisation. In this regard, he suggested teaching twos first, then fours, then eights, followed by threes, then sixes, then nines, and finally fives, using dots. Illustrations of the examples he gives below are provided. In this section, it is thought that Çoruh actually taught the multiplication table in a manner close to rhythmic counting. In this regard, as mentioned earlier, it is thought that he aimed to teach the multiplication table through rhythmic counting rather than memorisation. Çoruh presented the following examples on pages 38 and 39 of his book as templates for teachers. These examples are considered to serve the above idea.

Although the templates presented in his book are not entirely interactive or playful, they use modelling to create visualisations. This is thought to increase the retention of the subject matter.

In the following pages of the chapter, when explaining the step-by-step process for the next step of multiplication, he deliberately makes a mistake and emphasises the importance of explaining why the result is wrong. In doing so, he mentions the importance of questioning the results by comparing them with the above support and multiplication cards, using dominoes or the products of the tens and ones within the number. An example of an incorrect operation provided in this context is as follows.

It is stated that the aim here is to ensure that the child learns multiplication by understanding it, not mechanically. This example was removed in the 1949 edition. The operation is performed in the normal way. This example is noteworthy and suggests that it could be a good brainstorming method. In this respect, it can be seen that Çoruh tried to enrich his book with different types of methods.

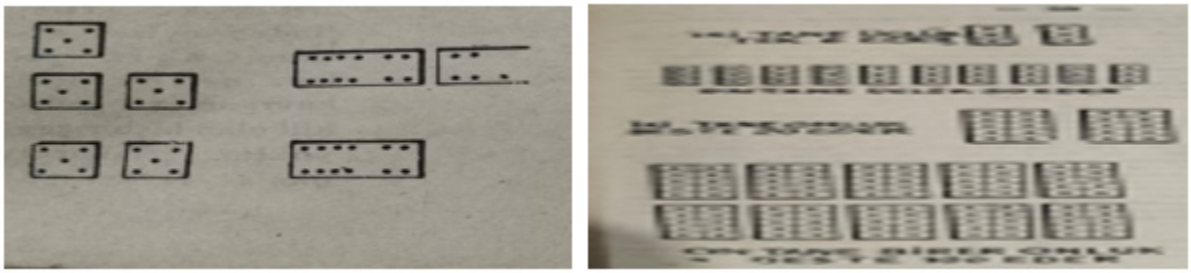

Fig. 3: Multiplication Steps

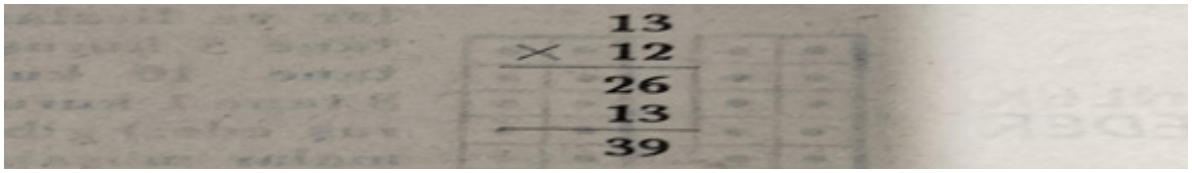

Fig. 4 Wrong Multiplication

When explaining division, Çoruh provided information that, just like multiplication, mental learning begins in the first grade and should be done in a meaningful way with the objects around them. He emphasised the importance of first separating the number into digits to understand the division of large numbers. As an example, to find the quotient of 63 divided by 3, he recommends first dividing 60 by 3 and then dividing 3 by 3. He suggests that using coins, objects, or symbols may be more effective in this process.

Çoruh uses an example to explain the division of large numbers. In this example, he recommends ignoring the last two digits when dividing 3928 by 828. He states that finding a result of 39:8 will make the task easier. In his book, he suggests that the resulting quotient should be multiplied by the divisor, and then the divisor should be discussed. In this way, the division is discussed and the result is reached through discussion. The main aim here is for students to perform a kind of rounding operation and then carry out the calculation. However, although this is correct for these numbers, it will not be functional for numbers exceeding 850. But even in this state, it is thought that the subsequent discussions will actually reveal this situation. Consequently, it is thought that this method could be effective for children who learn multiplication quickly to repeat and interpret multiplication. In the book published in 1949, this situation is described as follows: «The number obtained by this division may not necessarily be the desired number. However, an approximate number is obtained, and the exact number to be divided can be found accordingly (Çoruh, 1949).

Considering these aspects, Çoruh's approach of first using money examples to help students grasp the concept and then presenting the shape aspect of the topic seems more appropriate from a teaching perspective. Furthermore, when considering Çoruh's approach through interaction and play, although he is thought to have recommended interaction more in this regard, his inclusion of dominoes in the process, while not entirely a playful process, is considered very valuable as it uses play tools. In addition, Çoruh's modelling using coins and dots is still one of the methods used today.

Some Conveniences in Teaching Decimal Fractions

In this section, Çoruh argues that instead of forcibly "sticking" information into memory, it should be appropriate to the child's wishes, age, mental state, and real needs. It is stated that the most important motivation for students' learning is "interest." It is emphasised that when this interest is genuinely present, lasting learning occurs. Çoruh claims that the reason for failure in mathematics is the inability to concretise and the compulsion to memorise things written and drawn on the blackboard. He states that concretising these things would be more beneficial to teachers and students. In doing so, he recommends that lessons be integrated with work, movement and play. He predicts that artistic teachers would be more successful in doing this.

In terms of teaching decimal fractions, today's curriculum begins in the second grade with pictures of fruit, vegetables, cakes, etc. to help students understand the concepts of half, quarter and whole. Similarly, it has been observed that teaching with money, which Çoruh frequently uses, is included in books as a separate heading, solely for teaching about money. Representation in the form of fractions is seen in the third grade. Here, too, other fractions are taught using unit fractions, and an attempt is made to teach the sizes of fractions first.

Çoruh stated that the teaching of decimal notation to students should begin in the 3rd grade. At the beginning of this topic, he requested that fabrics be brought to the classroom, proceeding from the concretisation mentioned above. It was stated that they should start a discussion in the classroom about how long the measurements written on these fabrics as fractions should be, by labelling the measurements. He also requested that the fabrics be cut according to the given measurements. However, it was recommended that these numbers be taught not only in metres but also in monetary terms. Initially, for teaching fractions, Çoruh recommended writing on a template called a «cashier›s calculation table,» but later suggested writing these numbers without the lines on the templates.

WHOLES			FRACTIONS		
Hundreds	Tens	Ones	Tenths	Hunderedths	Thousands

Fig. 5: Cashier's calculation table

As can be seen, in today's mathematics education, the whole part and the fractional part are referred to as wholes and fractions. Furthermore, the names of the digits in the fractional part do not progress as tenths, hundredths, and thousandths, as they do today, but rather as tens, hundreds, and thousands. This indicates the gradual removal of the template and the transition to teaching the decimal numbers point. The following template can be given as an example.

At this stage, Çoruh particularly emphasises the importance of questioning what the decimal point means and why it is used. He believes that this questioning is very valuable and that it will help to construct the meaning of the numbers that come after the decimal point.

Similarly, by working on half numbers, he again used a table to teach that the zeros added after the decimal point or before the whole part have no value.

Additionally, it requests an example that is both concrete and demonstrates the multiplication of a decimal number by 10, specifying that 10 pieces of string, each 0.425 mm long, should be prepared and the total length measured when joined end to end. It explains the opposite of this operation, shifting the decimal point to the left, with the following example. Outside of school, a 12.5 m stake should be taken, first cut into a 1.25 m stake, and it should be shown that this length is one-tenth of the larger one. Then, an example should be given to teach how big 0.125 m (125 mm) is, what fraction of the stake it is, and how the decimal point shifts. However, the biggest problem here seems to be that the student must already have a ready understanding of the concepts of metres, centimetres and millimetres and have learned how they increase and decrease as multiples. In this way, the displacement of the decimal point is taught. Thus, a type of teaching method is adopted that is not mechanical or clichéd, but rather based on doing and experiencing. Furthermore, Çoruh deemed it appropriate to teach the position of the decimal point in decimal fractions and how numbers increase and decrease at this stage using a template called the "cashier's calculation table".

This section also covers the topic of "adding decimal fractions". It is emphasised that a prerequisite

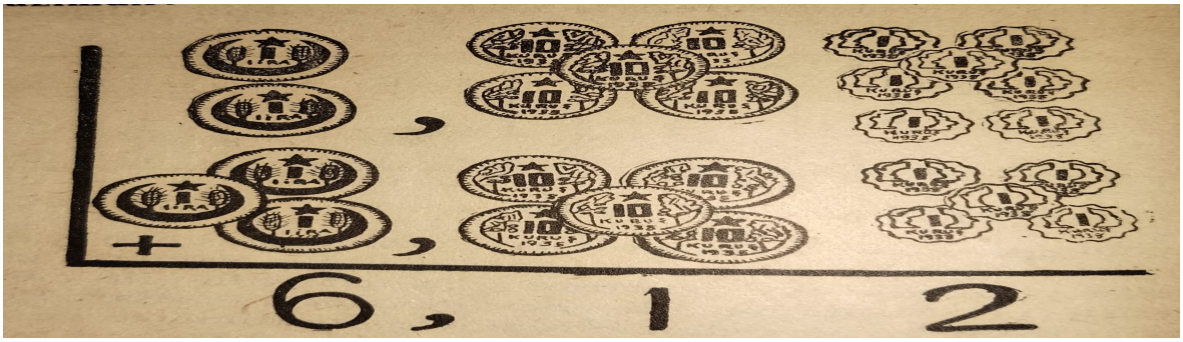

Fig. 8: Teaching addition operation with money ex.

for this operation is the transition from fractions to whole numbers (here referring to the whole part of decimal fractions) by breaking down the support, and that the work can be done with multiples of the metre. In addition, as a second method, coins are used, and the book frequently includes examples using coins. In some sections of the book, it is stated that students should also perform these calculations in class. In the addition of decimal fractions, the method of adding by aligning the decimal points, which is still used today, is first explained, followed by its applications. Important points include writing zeros for digits that are not present when aligning the decimal points and starting the calculation from the right.

Similarly, in the section on "Subtracting Decimal Fractions," Çoruh states that using coins makes subtraction more effective and explains the process with examples, as shown below. The example he uses is: "I had 0.35 lira (35 kuruş), I spent 0.28 of it, how much money do I have left?". **Çoruh explores this topic in depth by illustrating it with various examples**. When teaching multiplication of decimal fractions, he states that it is easier to first teach multiplication of whole numbers and then move on to the other. He states that starting with a question such as "How much is 4 kilos of oil at 6 lira per kilo?" is the correct approach. First, he calculates that since there are four of them, 6+6+6+6=24 lira, and emphasises that remembering that 6x4=24 is a good way to remember and perform the calculations. Then, he moves on to another question: "We bought three kilos of plain oil at 4.20 lira per kilo (4 lira 20 kuruş). What will we pay?" In this question, as in the previous one, it is found that 4.20 + 4.20 + 4.20 = 12.60 lira. Then, these numbers are written one below the other with the result, 4.20 x 3 = 12.60, and the class is asked to discuss how this is done. One important detail here is where to place the decimal point. The next question is, "If we buy 3.5 kilograms of oil at 4.20 lira per kilogram, how much will we pay?" The specific aim here is to teach where to place the decimal point. To do this, the placement of the decimal point is discussed first through addition and then through multiplication.

While there is not much research or exploration on the decimal point today, Çoruh presented a very practical and lasting teaching method at that time. However, it is considered very important that the value of the zero at the end is not confused during these operations.

Çoruh stated that the division of decimal fractions should be examined in three ways: fraction to fraction, fraction to whole number, and whole number to fraction. While teaching this topic, he emphasised that the lira and metre could be important for children›s understanding. These topics were explained using numbers that can be divided by each other. In this work, he emphasised the importance of writing down and communicating to students the rule that «since dividing a fraction by a fraction is like dividing integers by integers, in dividing fractions by fractions, the fractions are freed from the decimal point and divided like integers». Subsequently, as shown below, Çoruh explains his example by transitioning to decimal numbers using a practical method he calls the left-shift rule for removing the decimal point, which is an easy way to remove the decimal point by first dividing whole numbers (without decimal places). Using this example, he demonstrates operations that yield equal results by shifting the decimal point and performing operations on numbers that are equal to each other. After this, he explains

Fig. 9: Teaching addition with money example' operations

the division of numbers that can be divided from each other using money. He exemplifies these operations in the book with the following steps.

Çoruh attaches great importance to shifting the decimal point when performing these operations and explains them using money. For example, in this lesson, he asks, «If I divide 0.50 lira (50 kuruş) between two people, how much will each person get?» In this type of question, students must first understand that 0.50:2=5.0:20=50:200. He showed that the result of this division would start with 0 whole. Here, he completed the number 50 to 500 by shifting the decimal point and writing (0, ...) in the division section first. Since there are two 200s in 500, he subtracted 400 and showed that 100 remained. Then, just as we do today, he converted 100 to 1000 and wrote the result as (0.25) since there are five 200s in 1000. Çoruh also explained this process using money. To do this, he first specified that 0.50 lira should be concretised as 50 kuruş, which should first be shown as 5 ten-kuruş coins and divided between two people. Then, the remaining single ten-kuruş coin should be converted into 10 one-kuruş coins and divided between two people as 5 kuruş each. Finally, it is seen that each person receives 25 kuruş. It should be stated that this is equivalent to 0.25 lira.

Under this heading, a subheading titled "Converting Decimal Fractions to Common Fractions" states that this should be demonstrated by comparing the sizes of examples such as 0.5, 0.25, 0.4, and 0.1 with metres and coins. This section and the rest of the chapter include opinions on writing decimal fractions using money and teaching them with money. Some examples are explained using the unit formerly used, which was 40 para, equivalent to 1 kuruş. This chapter explains almost the same examples in a more understandable and accurate manner under separat11e headings, using individual examples from a book published in 1949.

When comparing today's textbooks with Çoruh's book, it seems much more appropriate that Çoruh's book suggests moving on to addition and subtraction using money after children have grasped certain concepts through interaction with money or fabric. Çoruh's use of money and other materials to reach the student's level does not indicate that he recommends interactive or game-like processes. The game here should be thought of more as gamification. In addition, it shows that he places more value on modelling.

Some Conveniences in Teaching Common Fractions

Common (unit) fractions and decimal fractions are covered in this section. It is stated that the important thing here is for the teacher to ensure this understanding through visual or concrete means. It is emphasised that teaching with food, pencils, sticks, coins, etc. will facilitate learning. Çoruh emphasises that it is important to show what is being taught rather than each slice of the divided object. As a subheading, when formulating this in writing fractions, a writing format (how much is taken from/how many parts the whole is divided into) is given one below the other with a fraction line. It is frequently emphasised that the reasons why the denominators do not change should be demonstrated through examples, using examples of addition with fractions collected in such a way that the unit fractions form a whole. Following this section, it is attempted to express verbally that the denominator of whole numbers must be 1, and although this appears to be a bit more like deduction, it is a method given by dictation. The examples and logic mentioned by Çoruh show that the first examples are in the third grade. No interactive or game-like examples were encountered in the textbook. Only a few examples based on placing models were found in current books. The topic was covered very briefly.

Following this section, Çoruh emphasised in his book that it is important to perform subtraction with fractions in the same way as addition. Then, for the multiplication operation, it explained using money again, starting from the sub-units of the kuruş (1 Kuruş = 40 para). It also explained the division operation in the same way using money, with examples such as "How many 0.25 lira are there in 2 lira?", questioning how this operation is done and explaining that the second fraction is inverted and multiplied. At the end of this section, he explained simplification by diversifying fractions that are half in size and accepting that they are all equal. However, it does not involve any operations.

How Should Problems be Structured?

Çoruh has provided information and opinions on what qualities problems should have in this section. Accordingly, he emphasised that questions should first be evaluated in terms of their context and should be appropriate for life and the lesson. In this regard, he stated, «Some teachers turn arithmetic lessons into riddle and puzzle lessons, making primary school children responsible for solving problems. Problems that have little place or value in life are harmful to primary school children. Furthermore, arithmetic lessons are not solely about problem solving. Neglecting the operations of arithmetic itself and failing to provide repetition and practice to reinforce them leads to children developing weakly and superficially (Çoruh, 1945, p.74)." In the 1949 edition, he repeats the same statement: «Some teachers turn arithmetic lessons into riddle and puzzle lessons, making primary school children responsible for solving problems. Problems that have little place and value in life do not benefit primary school children. On the contrary, it is harmful. Because the belief that problem solving has no value takes root, and the child loses interest in these tasks (Çoruh, 1949, p. 76). It is thought that what is meant in this section is not that problem solving is harmful, but rather that the main aim is to emphasise how valuable arithmetic is. Furthermore, in the following paragraphs, it states that arithmetic is a prerequisite for problem solving. In this section, it gives examples of problems that are appropriate for real life and the flow of life. For example, it states that problems involving chickens and rabbits cannot be realistic because they cannot be kept in the same coop, and therefore they are contrary to reality. Another example highlights that, particularly in the first years of primary school, when giving money for shopping, the question of how much each item might cost should not be asked beforehand. This is because when buying something, one should first ask the price and then make the purchase. He gives this advice out of concern that this could become an incorrect teaching method. This is a situation that is overlooked today. It is very valuable that these things were considered at that time. Similarly, Çoruh recommended that students be given as many questions as they could solve as homework, contrary to today's examination systems. This is because it is very valuable to feel the concern that this situation may cause students to be unable to answer the questions, thereby leading them to lie and engage in wrong behaviour.

Some Simplifications in Teaching Measurements

The first thing that stands out regarding the section on measurements is some minor changes in the 1945 and 1949 editions. In the 1945 edition, measurements are presented as length, changes in unit measurements, surface measurements, volume measurements, weight measurements, capacity measurements, and time measurements. In the 1949 edition ( ), the headings were changed to length measurements, area measurements, volume measurements, capacity measurements, and time measurements. The second edition also included the subheadings or omitted headings from the first edition.

Çoruh states that there are three main measurements: length, weight and time. In addition to these, he mentions the existence of measurements for gas, water, electricity, etc., apart from the headings mentioned above.

Regarding length measurement, it explains that the metre is the basic unit of measurement and is one forty-millionth of a meridian. It mentions that when teaching this, teachers can first encourage students to think about length estimates (estimating length by steps, estimating the length of nearby objects, the length of steps and spans of hands and arms). He then states that lengths such as decametres, metres, hectometres, and kilometres should be taught by measuring them by walking or using other objects (such as a string). This approach, which is largely neglected in today's mathematics education, is considered a valuable approach for both that period and today in terms of manual measurement and visual-spatial intelligence. Stating that teaching these concepts using a template is very valuable, Çoruh uses a template referred to as a "cashier's slide rule" to explain the submultiples and multiples of the metre, just as he did with decimal fractions, using whole numbers and fractions.

In surface measurements, he emphasises that it is important to first grasp the concepts of width and length. Since the priority here is for children to see what is called an area, he recommends covering an area with other objects. For example, it begins by covering the surface of an envelope with the envelope itself, covering an area with squares, covering a surface with square mosaics, or showing the remaining surface when one of these is placed on it to make the concept of area clear. It recommends making them aware of this by measuring these surfaces with a metre and then discussing their relationship with the dimensions of width and length. However, it does not go into too much detail on this subject.

For volume measurements, it suggests that it may be beneficial to start by filling some boxes or objects (bucket, package, matchbox, etc.) with water or sand to show that width and height are insufficient. Here, as with area measurements, without going into too much depth, the different ways of writing and reading based on three dimensions are given through an example.

It is stated that students need to see weight measurements and that it is important for them to weigh things by hand, emphasising the importance of using all grams and kilograms. What is meant here is that the scales used in grocery stores in the past are thought to be the weights sent to schools as materials. No further details are given.

It was deemed valuable to demonstrate, using hands-on materials they would prepare themselves, that 1 cubic decimeter is equal to 1 liter. Additionally, it was emphasized that not every 1 liter of liquid weighs 1 kilogram, and that attention should be drawn to the expansion and contraction rates of liquids. It began by stating that minutes are a measurement that children are largely unfamiliar with. It was suggested that lessons could begin by drawing attention to this, for example, by having children raise their arms and wait for one minute, counting for one minute, or reading a book for one minute. It was then stated that a clock should be made (it was recommended that it be made of plywood in the 1949 version) and that all the elements of the clock and how to read it could be taught there. Information is also provided on the 24-hour teaching method, stating that 12 hours should be added to the clock. A notable example in this section is given for seconds. Çoruh states that teaching seconds can be done with a metronome as well as with the minute hand. This demonstrates his interdisciplinary approach to the process. As mentioned above, it is seen that Çoruh does not use interactive processes in the explanation or exemplification of these topics.

Some Simplifications in Teaching Graphs

No statement is encountered regarding which graph can be used for what purpose and what it can represent. However, examples are given on how it can be drawn and how it can be used visually. For example, it is stated that for a bar graph, the visual representation of sizes formed by stacking small iron coins, shown as rectangular columns, would be both meaningful and provide an easily learnable environment for the student. Then, in the same way, a line graph was shown, using the example of showing the instantaneous change in a patient's temperature, based on a thermometer visual column graph. Then, the pie chart was explained using data with % symbols, mentioning that it would be 360 degrees without much explanation.

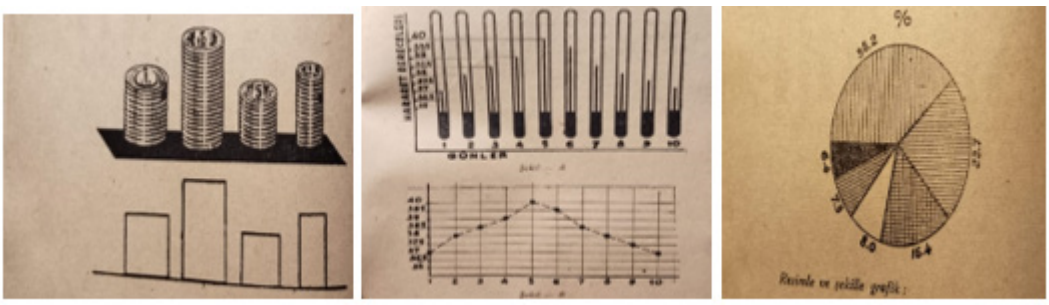

Fig. 10: Example chart drawings in the charts section.

Finally, this section presents a graphic example known as the "Vienna method" and referred to as "ISOTYPE." However, this example is not presented in the same way as contemporary examples. This example appears in both books. It should be regarded as a formal introduction. However, there is no interactive or game-like process.

Percentage Calculations

In the second book, this topic is placed after the heading related to proportion. Here, priority has been given to this heading, taking into account the first book published in 1945. It is accepted that the reason for this is that Çoruh realised that he had not considered this in the first book, as the application area of percentages is interest calculations. In this section, it is recommended to discuss the topic with children beforehand and then present it. While doing so, it is again suggested to use money. However, apart from this, the topic is presented in the book solely through examples. An interactive method has not been encountered.

Some Simplifications in Proportion Calculations

Moving beyond the warnings given in another section of the book regarding proportion calculations, the topic begins with an example teaching the unit price of a purchased item. It is now considered that these topics should be taught towards the end of primary school. The question is: "80 oranges cost 320 kuruş. How much would 160 oranges cost?" First, one orange is found using this example, then 160 oranges are found to cost 640 kuruş by multiplying the price of one orange, which is 4 kuruş, by 160. Çoruh then states that it is necessary to move on to proportion from this question. Here, as is the case today, he states that it is necessary to establish a direct proportion based on the idea that the price should increase as the number of oranges increases, and shows which numbers should be multiplied and which should be divided. Direct proportion was then explained again using an example where the number of oranges decreased. However, when explaining inverse proportion, it was discussed using the classic example of the number of days required for a worker to build a garden wall, showing how an increase or decrease in the number of workers causes one side to increase and the other side to decrease, and questioning situations where the opposite occurs. Subsequently, which numbers should be multiplied was explained using the same example. While explaining these topics, Çoruh did not utilise an interactive method.

Interest Calculations

Interest calculations also began with a question such as, "If 100 kuruş brings 4 kuruş interest per year, what will 500 kuruş bring?" Then, a table was shown with 5 separate 100 kuruş, each showing 4 kuruş, and 4 kuruş written opposite, with the total result being 20 kuruş, to emphasise that interest is not something to be afraid of and that it is simple. It was then explained that this was done using direct proportion. Subsequently, examples were given of how different questions could be taught using compound proportion, which has been removed from today's mathematics teaching programme. The topic was then explained by introducing variables such as year, day, month, and the divisors required for interest calculation .A generally rote learning approach was followed.

Household Accounts

Here, the focus appears to be on explaining family economics through income-expense, profit-loss, and cost calculations. It is suggested to use grocery ledgers, trade calculations, and household expense calculations. This section is dated 20/12/1944. The explanation here is very superficial. It is thought that the aim is simply to encourage the teacher to create contexts based on the home when establishing contexts.

Discussion, Conclusions and Implications

Selâhattin Çoruh is a figure who pioneered many ideas in Turkey, particularly in the field of tourism. He has left behind valuable works not only in tourism but also in education. One such work is his book "Teaching Arithmetic," published in 1945 and 1949. The book was prepared for primary school teachers. It provides them with valuable, mind-opening practical examples. These examples and games represent a perspective that goes beyond the educational

understanding of the period in Turkey. As Hill et al. (2008) noted, through his book, Çoruh sought to understand what pupils were doing by utilising his own knowledge and insights into them. It is valuable not only in terms of mathematics teaching but also because it encourages the use of interactive methods such as games and activities in education. Although he does not recommend it for teaching all subjects, he does recommend the use of games and activities for teaching certain subjects. As Msezane (2022) recounts, although there was no mention of an exam at the time, Çoruh believed it was wrong for students to focus solely on passing exams and advancing to the next level without even attempting to apply what they had been taught—a consequence of an exam-oriented curriculum—and therefore placed great importance on having his students practice and play. In this way, the teacher's role is elevated to that of a knowledgeable and supportive figure who, just as in Öztürk and Kilmen (2022), helps students value mathematics more, presenting the process of learning mathematics as both enjoyable and requiring effort. Consequently, the book serves as a guide for teachers in this regard.

A review of the documents reveals that Çoruh's work mainly encourages the use of games to allow children to experience feelings of enjoyment and pleasure after learning the objectives. He stated that another benefit of this is that it is effective in helping students develop many characteristics, such as self-expression, personality development, group awareness, and preventing students from exhibiting undesirable behaviour. In addition, it has been observed that he used these to ensure lasting learning. It has been determined that he was the first person to introduce games into the education system as a very important tool that would serve the education programme, which operates on the logic of "group teaching", with students valuing unity and achieving things together.

This is also related to the concept of 'sociomathematical norms', which was proposed much later by Yackel and Cobb (2008). According to Yackel and Cobb (2008), the mathematical aspects of teachers' and students' activities in the classroom can be analysed and discussed through these norms.

Consequently, it is important to foster general classroom social norms to enhance interaction among students. Çoruh proposed achieving this through games. It is thought that by creating a classroom atmosphere conducive to problem-solving and inquiry, the games he incorporated into mathematics—which serve this purpose—are also utilised to foster social interaction.

It has been seen that the games Çoruh gave as examples, which were mostly about numbers, paucity and abundance, were for those new to school, thus limiting the idea he put forward. He closed the door to studies on games for upper grades in his first book with his idea that playing games in upper grades was harmful. However, he did not use such definitive language in his second book.

Although he emphasises the connection between problems and arithmetic and real life, he does not mention problem solving in a dramatic context. In his book, he states that if problems have little place or value in life, then such problems are harmful. He particularly emphasises that the type of problem-asking to be avoided, especially in the early grades, as he mentions in his first book, is questions such as "What is the price of one apple if the total price of 6 apples is 48 TL?" The unsuitability mentioned here is that people do not buy something by the piece without knowing its unit price. An examination of this example from Çoruh reveals that, much like the views of Toraman & Toraman (2025), it embraces the understanding that grounding mathematics in real-life problems and learning meaningful concepts through instruction facilitates the development of students' abilities. This is because the ability to see the practical applications of mathematics in their own lives is encouraging for these students.Therefore, Çoruh does not find this appropriate. What should be understood from this is that Çoruh also considers misconceptions important and addresses them in his book. It is a valuable insight that he emphasised the importance of problem-solving, which is still considered valuable today and one of the highest-level skills, at that time and highlighted it in his book. It is also very valuable that he pointed out sensitive issues such as the one above while doing so. Furthermore, paying attention to the details

of constructing problems that are relevant to real life is not a common practice even today. However, Çoruh's detail-oriented approach is evident in his statement that the price of an item should be asked and learned first, and then the payment should be made according to how much is to be purchased. For example, in questions such as "How much is 3 kilos of apples that cost 25 TL per 5 kilos?", he states that directing children to shop without first learning how much per kilo costs is misleading them and that he is against this, which shows how meticulous he is on this subject.

An examination of Çoruh's book reveals that he had different perspectives on mathematics compared to his contemporaries. Some examples that show how different he was include questioning the use of the decimal point in mathematics and its meaning for someone living at that time, trying to find the questions he would ask through discovery, starting lessons with a kind of warm-up, beginning the subject with intriguing questions, choosing questions from real life, and encouraging the frequent use of materials such as money, metronomes, etc. Even today, the teaching methods and tools he recommended can still be used. In this respect, it also resembles the view expressed by Akbıyık and Tavil. Practitioners can obtain these objects from the environment according to the mathematical concepts and skills they intend to teach, as well as the types of concepts and operations, and use them in the instructional process. Especially for elementary school students and individuals with special needs, it is necessary to use these objects for concretization (Akbıyık &Tavil, 2024).

The use of interactive methods such as games and activities, which are also the subject of research from Çoruh's perspective, is an understanding far ahead of its time for Turkey. Although Çoruh generally used these methods as reinforcements, he used them as preparation for numbers. Similarly, it is important that he foresaw the use of movement and rhythm in education and recognised this at that time.

The idea that games should only be played at the beginning of primary school, which is one of Çoruh's views in the book and which he addresses in softer terms in the second book, contradicts current research. It seems that Çoruh's concern here is the idea of losing control of the class. This is because Çoruh sometimes also considers games to be a means of entertainment. Apart from this perspective, it is not considered appropriate to compare it with today's understanding, as he did not adopt an approach that could be questioned with regard to games. It is understandable that Çoruh had these concerns, as his understanding of games sometimes lent itself to situations where the fastest or the one who understood the subject could always win.

It is thought that Çoruh's perspective on the problem, such as revealing the sequence he follows in mathematics teaching, could shed light on both programmes and textbook writing. On the other hand it will be particularly important for primary school teacher and mathematics teacher candidates to review these books and its contents within their courses during their university education. This is because this book contains inspiring contents for teaching mathematics.

Finally, on the other hand, someone examining Çoruh's books might question whether his perspective resembles creative drama in education as a method. However, Çoruh's perspective is limited to the use of games and activities, and to the students' re-enactment of a moment within the classroom, as he suggests. This approach is certainly not the same as creative drama in education, which is more complex and progresses within a specific sequence; nor is it the same as the discipline of drama. The first recorded encounter with drama in education dates back to the late 1800s and early 1900s. If Çoruh had held such a view regarding drama in education, it is thought he would have expressed and specified it. This is because the earliest publication date of the books is 1945. Consequently, it has been accepted that the view put forward by Çoruh represents an understanding and perspective entirely his own. In other words, there is not even a hint of a connection between drama in education and Çoruh's views.

Declaration of Interest

The authors declare no competing interests.

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