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An Analysis of Mathematical Concepts in the 4th Grade Social Studies Textbook

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Abstract

In Türkiye, it is crucial to link the 4th grade social studies course with mathematical concepts to unveil the interdisciplinary coherence of the curriculum. This study aims to identify mathematical concepts in the social studies textbook for 4th graders and explore how these concepts are presented. To attain this goal, document analysis is employed. The data for this study were sourced from the primary school 4th-grade Social Studies textbook, which was created according to the 2018 Social Studies Curriculum, and the 2018 Mathematics Curriculum. Descriptive analysis was used to analyze the data. The results revealed that the social studies textbook included mathematical concepts from various learning areas in the mathematics curriculum. Among these areas, measurement was the most common, followed by concepts related to numbers and operations. Additionally, the social studies curriculum supports mathematics skills by incorporating concepts related to geometry and data processing into its learning areas. This offers primary school teachers an opportunity for interdisciplinary instruction.

Keywords: Mathematical concept, primary school mathematics curriculum, interdisciplinary approach, social studies.

Introduction

The relationship between different disciplines has a long history (Özaydınlı-Tanrıverdi & Kılıç, 2019). The narrowed perspective that comes with viewing disciplines in isolation is recognized (Şahinkaya & Aladağ, 2009). The fundamental concept of interdisciplinarity in education involves the merging of two disciplines or fields and using the methods and knowledge of the related fields (Jacobs, 1989). Interest in interdisciplinary approaches in education has grown significantly, resulting in a considerable increase in publications, particularly since the 2000s (Turna & Bolat, 2015). Interdisciplinary approaches aim to guide students towards higher-level learning and ensure the acquisition of advanced skills (Aybek, 2001). Furthermore, such approaches have diversified into multidisciplinary, cross-disciplinary, and transdisciplinary approaches. The multidisciplinary approach merges no less than two disciplines, while the cross-disciplinary approach bestows an alternate viewpoint from that of one discipline to another discipline. The transdisciplinary approach aims to eliminate boundaries between disciplines (Aktan, 2007; Turna & Bolat, 2015). The interdisciplinary approach comprises three dimensions. The curriculum aims to establish connections between disciplines in the first horizontal dimension, while prioritizing the creation of interdisciplinary connections between contents at different levels in the second, or vertical, dimension. The third dimension involves linking newly acquired knowledge with work and life experience (Aladağ & Şahinkaya, 2013, p. 159).

It is found that primary school teachers pay attention to the usability of a concept, topic, or theme in different disciplines for the practice of interdisciplinary teaching approaches (Anık et al., 2023; Aslan & Karakuş, 2016). The main goal of teachers in making associations is to provide students with multiple and different perspectives. In the related literature, it is emphasized that the interdisciplinary teaching approach is to provide students with different perspectives (Yıldırım, 1996). In terms of the benefits of integrating different disciplines into the learning process, it can be said that it contributes to better understanding, critical thinking, and problem solving skills among students (Baş et al., 2021; Doğan, 2014). There are four cognitive skills that are promoted in the interdisciplinary approach, such as students' perspective taking, developing structural knowledge about problems, distinguishing different views from different disciplines, and making cognitive progress in understanding problems in an

interdisciplinary way (Demirel & Coşkun, 2010). These skills contribute to students' progress by viewing problems holistically. In Türkiye, it can be seen that the curricula have recently been updated and more attention has been paid to the skills that students should acquire with an interdisciplinary perspective (Sezgin et al., 2018).

Social studies and mathematics are two separate disciplines, each with different learning goals and learning processes. However, there is an important intersection between these two disciplines (Yıldız, 2021). The integration of social studies and mathematics education in an interdisciplinary approach is necessary to promote students' understanding of real-world problems, develop critical thinking and problem-solving skills, guide interdisciplinary learning, prepare students for future challenges, and address educational standards. This integration enhances the learning experience for students and equips them with the knowledge and skills necessary to succeed in an interconnected world. It is emphasized that connections to other disciplines should be made at appropriate times while teaching the learning outcomes in the social studies and mathematics curriculum (Ministry of National Education [MoNE], 2018a; 2018b).

Social studies and mathematics can work together by establishing an interdisciplinary relationship. Connections such as data analysis and statistics, maps and scales, graphs and tables, time and history, budgeting and financial planning, analysis and problem solving can be made between social studies and mathematics (Bekdemir & Başbüyük, 2011). Thanks to these connections, students can apply the skills they learn in mathematics classes to social studies classes and help make these classes more meaningful and interesting (Pala & Başbüyük, 2019). The use of these mathematical skills in the social studies curriculum helps students to see the connections between different disciplines and to have a more holistic learning experience. In addition, these skills provide students with important skills that they can use in their daily lives and future careers.

Before examining the mathematical concepts in social studies content, it is necessary to explain how the mathematical concept is defined in the literature. The most important element of mathematics education is the teaching of mathematical concepts. In mathematics education, failure to learn the concepts or learning them with misconceptions can cause problems (Dede & Argün, 2004). Misconceptions about mathematical concepts, also referred to as mathematical difficulties, may have epistemological, psychological, and pedagogical reasons (Bingölbali & Özmantar, 2010). In primary education, there are many mathematical concepts such as numbers, addition and subtraction, fractions, and measurement. In the elementary mathematics curriculum in Türkiye, there are learning areas of numbers and operations, geometry, measurement, and data processing (MoNE, 2018b). Interdisciplinarity can be achieved by linking the concepts related to these learning areas with the topics of the social studies curriculum.

Social studies and mathematics are important areas for understanding the world. However, there may be cases where they are perceived as unrelated fields. The reason for this situation may be related to the assessments applied in standardized examinations (Eryılmaz & Demirtaş, 2022). In the field of social studies and mathematics in Türkiye, the effect of mathematical skills on map reading skills (Pala & Başbüyük, 2019), map reading skills (Ertuğrul, 2008; Sönmez, 2010), map and direction graph reading and preparation skills (Akgün, 2010); techniques of using statistics and graphs in social studies (Akın-Köse, 2011); ability to use scale (İnel, 2011); ability to understand time and chronology (Akbaba et al., 2012; Ablak and Aksoy, 2021; Kekeç, 2018); and ability to determine location coordinates (Kuşçu,

2011). On the other hand, very few studies were found to evaluate the association between the social studies program and the mathematics course (Aladağ & Şahinkaya, 2013; Şahinkaya & Aladağ, 2009). In Türkiye, it is important to link the social studies course, which begins at the fourth-grade level, with mathematics concepts in order to reveal the interdisciplinary compatibility of the curriculum. In this study, the aim was to identify the mathematics concepts in the 4th grade social studies textbook and to reveal how the related concepts are covered. In line with this purpose, the mathematics concepts in the 4th grade social studies textbook, which was prepared according to the 2018 social studies curriculum currently in effect, were examined based on the 2018 mathematics curriculum. The sub-problems of the research are presented below:

1. What is the distribution of the mathematical concepts in the social studies textbook according to the learning area of numbers and operations in the mathematics curriculum?
2. What is the distribution of the mathematical concepts in the social studies textbook according to the learning area of geometry in the mathematics curriculum?
3. What is the distribution of the mathematical concepts in the social studies textbook according to the measurement learning area in the mathematics curriculum?
4. What is the distribution of the mathematical concepts in the social studies textbook according to the data processing learning area in the mathematics curriculum?
5. What is the distribution of the mathematical concepts in the social studies textbook according to the learning areas in the mathematics curriculum?

Method

The study relies on document analysis as a methodology. Document analysis is a technique widely applied in various fields of research. Particularly in the context of educational research, it is leveraged to scrutinize student work, instructional resources, curricula, guidelines, and other written materials. Essentially, document analysis involves a systematic review of written sources to derive insights, facts, and meanings on a specific issue or problem (Bowen, 2009). Accordingly, the examination process entails accessing and interpreting information from existing documents. Document analysis may have limitations and challenges associated with bias in document selection (Cohen et al., 2007). Nevertheless, researchers can benefit from conducting document analyses by making historical and comparative investigations, as the analysis enables the collection of data from pre-prepared materials, rather than employing more time-consuming methods such as direct observation or interviews (Corbin & Strauss, 2008). Document analysis was preferred in the study due to the research problem's connection to the curriculum and textbook, both teaching materials. This necessitated documents as a data source.

Data Sources and Data Analysis

According to the research problem, the Primary School Social Studies Textbook, which was approved for teaching for five years starting from the 2018-2019 academic year with the decision of the Education and Instruction Board of the Ministry of National Education on May 28, 2018, and numbered 78, and the Mathematics Course Curriculum, which has been in effect since 2018, were used as data sources. The primary school social studies textbook was written by Sami Tüysüz and published by Tuna

Matbaacılık in 2022. The textbook in question is still being used in the 2022-2023 school year in which the research was conducted.

Document analysis is a qualitative research method that is carried out with a specific systematic approach. It is recommended to follow certain steps in order to apply this analysis successfully. In this study, the following steps were followed regarding the stages of document analysis (Foster, 1995, as cited in Yıldırım & Şimşek, 2021):

- *Access to documents:* The mathematics curriculum used as a data source in the study was accessed from the website of the Presidency of the Board of Education and Discipline on Curricula, and the primary school social studies textbook was accessed from the Education Information Network (EBA).
- *Verification of the authenticity of the documents:* Both documents used as data sources in the study were obtained from the official websites of the Ministry of National Education of the Republic of Türkiye.
- *Understanding the documents:* The primary school social studies textbook and the mathematics curriculum were subjected to an analytical reading in the context of the research subproblems. Related readings were done by the researcher in order to understand the context of the documents.
- *Data analysis:* A mathematical concept data analysis table was created by the researcher to determine which mathematical concepts are related to the learning areas of the elementary social studies textbook based on the research subproblems. Based on the data analysis table, associations were made with the contents of the learning areas in the elementary social studies textbook. In these associations, the frequencies of the findings were given using descriptive analysis.
- *Use of data:* The data sources used in the study are publicly available. There is no possibility of anyone being partially or fully benefited or harmed.

The data sources and analysis of the study were carried out in accordance with the implementation of document analysis and the steps to be followed in this process. In other studies, the researcher may adapt these stages according to his/her needs and the research context.

Validity and Reliability

The research data were coded by two different experts and their coding was compared. A third expert was consulted to resolve the differences and necessary adjustments were made. Based on the data obtained, the reliability of the research was calculated using Miles and Huberman's (1994) formula " $\text{Reliability} = \frac{(\text{Agreement})}{(\text{Agreement} + \text{Disagreement})} \times 100$ ".

Table 1. *Inter-coder reliability analysis of mathematical concepts in the social studies textbook*

Learning Areas	Agreement	Disagreement	Inter-Coder Reliability
Numbers and Operations	417	25	0,94
Geometry	106	5	0,95
Measurement	485	19	0,96
Data processing	19	1	0,95
Total	1027	50	0,95

Table 1 shows that the codes created by two experts for the mathematical concepts in the social studies textbook are highly compatible (>.80) according to the learning areas.

The credibility of the study is related to the internal validity and is ensured by the correct interpretation of the data (Creswell & Miller, 2000). The findings of the study were supported with direct quotations to increase credibility. The confirmability of the research is called the criterion of objectivity and clarity (Bowen, 2009). The decisions of the researcher should be verifiable. In the research, the data analysis process was digitized and stored in an open and transparent manner, and it was explained how the results were reached. The transferability of the research is related to the external validity and shows whether the findings are valid in different contexts (Shenton, 2004). By defining the context in detail through purposive sampling, transferability was ensured for similar studies. Research coherence includes detailed explanations of how the processes of obtaining, using, analyzing, and interpreting data sources were carried out (Merriam, 1998). Consistency was ensured by following these methods throughout the research. Consistency was enhanced by coding with the data analysis table.

Ethical Permits of Research

In this study, all the rules specified to be followed within the scope of "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. None of the actions specified under the heading "Actions Contrary to Scientific Research and Publication Ethics", which is the second part of the directive, have been taken.

Ethics Committee Permission Information:

The research does not require ethics committee approval because it consists of completed documents that are registered and publicly available. In this article, the journal writing rules, publication principles, research and publication ethics rules, and journal ethics rules were followed. The responsibility for any violations that may occur in relation to the article rests with the author.

Findings

Findings Related to the Sub-Problem "What Is the Distribution of the Mathematical Concepts in the Social Studies Textbook According to the Learning Area of Numbers and Operations in the Mathematics Curriculum?"

The study's objective was to analyze the distribution of mathematical concepts in a social studies textbook within the numbers and operations learning area of the mathematics curriculum. Table 2 displays the results of this analysis.

Table 2. *Distribution of mathematical concepts according to the learning area of numbers and operations*

Learning Area	Sub-Learning Area	Frequency (f)
Numbers and Operations	Natural numbers	397
	Addition with natural numbers	8
	Multiplication with natural numbers	5
	Subtraction with natural numbers	4
	Fractions	2
	Division by natural numbers	1
	Total	417

According to Table 2, when the distribution of mathematical concepts in the social studies textbook according to the numbers and operations learning area in the mathematics curriculum was examined, a total of 417 mathematical concepts related to numbers and operations were identified. The vast majority of these (f=397) were in the natural numbers sub-learning area. In addition, addition with

natural numbers (f=8), multiplication with natural numbers (f=5), subtraction with natural numbers (f=4), fractions (f=2) and division with natural numbers (f=1) are also included in the social studies textbook.

Examples of the sub-learning areas in the mathematics curriculum that are prominent in the social studies textbook in the first sub-problem are given below:

Natural numbers sub-learning area, "*There are currently more than 7.5 billion people living in the world* (Unit 1-Page 11)."

Addition and subtraction with natural numbers sub-learning areas, "*I have a brother who is four years younger than me and an older sister who is three years older than me* (Unit 1-Page 16)."

Addition and subtraction with natural numbers sub-learning areas, "*Nowadays, while group games have decreased, games played alone have increased and children play games only at home* (Unit 2-Page 48)."

Addition with natural numbers sub-learning area, "*There is a landline phone in our house and two cell phones, one belonging to my mother and one belonging to my father* (Unit 4-Page 96)."

Multiplication with natural numbers sub-learning area, "*This line is extended five times the distance between two stars* (Unit 3-Page 64)."

Division with natural numbers sub-learning area, "*After analyzing the photos above, Yağmur divided them into two groups* (Unit 3-Page 70)."

Fractions sub-learning area, "*So much so that two-thirds of the country's land is covered with forests* (Unit 7-Page 174)."

Findings Related to the Sub-Problem "What Is the Distribution of the Mathematical Concepts in the Social Studies Textbook According to the Learning Area of Geometry in the Mathematics Curriculum?"

In accordance with the purpose of the study, Table 3 presents the results of the distribution of mathematical concepts in the social studies textbook according to the geometry learning area of the mathematics curriculum.

Table 3. *Distribution of mathematical concepts according to geometry learning area*

Learning Area	Sub-Learning Area	Frequency (f)
Geometry	Spatial relationships	77
	Geometric objects and shapes	26
	Basic concepts in geometry	3
	Total	106

Table 3 reveals the examination of mathematical concepts distributed in the social studies textbook encompassing the geometry learning area of the mathematics curriculum, revealing the identification of 106 mathematical concepts related to geometry. The majority of these concepts (f=77) were found in the sub-learning area of spatial relations. Additionally, the social studies textbook includes the sub-learning areas of geometric objects and shapes (f=26) and basic concepts of geometry (f=3).

In the second sub-problem, examples of the sub-learning areas in the mathematics curriculum that come to the fore in the social studies textbook are given below:

Spatial relations sub-learning area, "On the front side of my identity card, it says *REPUBLIC OF TÜRKİYE IDENTITY CARD* in Turkish on the top and in English on the bottom (Unit 1-Page 13)."

Geometric objects and shapes sub-learning area, "In sketches, easy-to-draw shapes such as rectangles, squares, circles and triangles are usually used (Unit 3-Page 69)."

Basic concepts in geometry sub-learning area, "In this case, the line that is assumed to pass through the center of the angle between 12 o'clock and the hour hand points to the south (Unit 3-Page 65)."

Findings Related to The Sub-Problem "What Is the Distribution of the Mathematical Concepts in the Social Studies Textbook According to the Measurement Learning Area in the Mathematics Curriculum?"

In accordance with the purpose of the study, the findings regarding the distribution of mathematical concepts in the social studies textbook according to the measurement learning area in the mathematics curriculum are presented in Table 4.

Table 4. Distribution of mathematical concepts in the social studies textbook according to the measurement learning area

Learning Area	Sub-Learning Area	Frequency (f)
Measurement	Measuring time	365
	Our money	79
	Measuring length	25
	Weighing	9
	Area measurement	4
	Measuring the environment	3
	Total	485

Table 4 shows that when the distribution of mathematical concepts in the social studies textbook was examined according to the learning area of measurement in the mathematics curriculum, a total of 485 mathematical concepts related to measurement were identified. A total of 485 mathematical concepts were identified, with the majority (f=365) found in the measuring time sub-learning area. In addition, the social studies textbook also covers sub-learning areas such as money (f=79), length measurement (f=25), weighing (f=9), area measurement (f=4), and perimeter measurement (f=3).

In the third sub-problem, examples of the sub-learning areas in the mathematics curriculum that are prominent in the social studies textbook are given below:

In the sub-learning area of measuring time, "The United Nations General Assembly adopted the *Convention on the Rights of the Child* on November 20, 1989 to guarantee children's rights (Unit 6-Page 152)."

Our money sub-learning area, "Her father gave Neşe an allowance of 35 TL to spend during the week when she went to school on Monday morning. However, Neşe spent all of her school allowance in two days. When she ran out of money, she asked for pocket money again (Unit 5-Page 138)."

In the sub-learning area of measuring length, "One of the most striking features of the madrasa was the doors of the classrooms, which were a little over a meter high (Unit 2-Page 42)."

Weighing sub-learning area, "I was born in Kırşehir on April 9, 2009 as a baby weighing three kilograms one hundred and eighty grams (Unit 1-Page 16)."

Sub-learning area of measuring space, "Vacuum cleaners were heavy tools that took up a large space when they were invented (Unit 4-Page 100)."

Sub-learning area of measurement of environment, "For example, distinctive places such as schools, mosques, post offices, banks, playgrounds, etc. can be found around our house (Unit 3-Page 68)."

Findings Related to the Sub-Problem "What Is the Distribution of the Mathematical Concepts in the Social Studies Textbook According to the Data Processing Learning Area in the Mathematics Curriculum?"

In accordance with the study's objective, Table 5 presents the results concerning the allocation of mathematical concepts within the social studies textbook based on the data processing learning area of the mathematics curriculum.

Table 5. Distribution of mathematical concepts according to data processing learning area

Learning Area	Sub-Learning Area	Frequency (f)
Data Processing	Data collection and evaluation	19
	Total	19

According to Table 5, when the distribution of mathematical concepts in the social studies textbook was examined according to the learning area of data processing in the mathematics curriculum, a total of 19 mathematical concepts related to data processing were identified. These concepts are also included in the sub-learning area of data collection and evaluation (f=19).

In the fourth sub-problem, examples related to the sub-learning area in the mathematics curriculum, which is prominent in the social studies textbook, are given below:

Data collection and evaluation sub-learning area, "After completing my studies, I showed the daily weather events and temperature values that I noted in my notebook with a picture table and graph (Unit 3-Page 74)."

Another example of data collection and evaluation sub-learning area is shown in Figure 1 (Unit 3-Page 75).



Figure 1. Example of data collection and evaluation sub-learning area

Findings Related to the Sub-Problem "What Is the Distribution of The Mathematical Concepts in the Social Studies Textbook According to the Learning Areas in the Mathematics Curriculum?"

The distribution of mathematical concepts in the social studies textbook, based on the learning areas in the math curriculum, is presented in Table 6 to align with the study's objective.

Table 6. *Distribution of mathematical concepts according to learning areas*

Learning Area	Frequency (f)
Measurement	485
Numbers and Operations	417
Geometry	106
Data Processing	19
Total	1027

Table 6 displays the overall distribution of mathematical concepts in the social studies textbook across all learning areas in the mathematics curriculum. The concepts related to measurement ($f=485$) and numbers and operations ($f=417$) ranked second, followed by geometry ($f=106$) in third place, and data processing ($f=20$) in the last position. In total, 1027 mathematical concepts were identified.

Discussion and Conclusion

It was found that the majority of the mathematical concepts in the social studies textbook were in the numbers and operations strand. They were found to be particularly concentrated in the natural numbers sub-learning area. In addition, it was found that addition, subtraction, multiplication, and division operations with natural numbers and concepts related to fractions were also included. This result shows that the social studies course not only deals with social issues but also includes mathematical concepts. The inclusion of mathematical concepts in the social studies course provides students with the opportunity to evaluate different issues from different perspectives. In fact, it has been emphasized that showing students the relationship between mathematics and other subjects can help them better understand the importance of mathematics in the real world (Moyer-Packenham & Westenskow, 2013). The intensive treatment of natural numbers and operations may be due to the fact that these concepts are frequently encountered in everyday life and social events. For example, topics such as the population of a country, economic data, or the timing of historical events require mathematical concepts (Stanic & Kilpatrick, 1989).

When the distribution of mathematical concepts in the social studies textbook was examined in terms of the geometry learning area, it was found that most of them were related to the sub-learning area of spatial relations. It was found that there were few concepts related to geometric objects and shapes and basic concepts in geometry. The inclusion of concepts related to geometry in social studies textbooks may be to help students develop spatial thinking and associative skills with their environment. In particular, emphasizing "spatial relationships" can help students understand topics such as geographic locations, boundaries, regions, and landforms (National Council of Teachers of Mathematics [NCTM], 2000). International literature suggests that spatial thinking and geometric concepts in social studies education help students better understand geographic and historical events (Liben & Downs, 1993). The fact that there is little information about geometric objects, shapes, and basic concepts may mean that these concepts are less applicable in the social studies context. However, geometry plays an important role in understanding spatial relationships in everyday life and identifying the objects around us (Van de Walle et al., 2014). Although geometric concepts and skills such as

locational orientation, map literacy (Akgün, 2010; Pala & Başbüyük, 2019), and spatial thinking are frequently included in the social studies curriculum (MoNE, 2018a), it is noteworthy that geometry content in textbooks remains limited. However, not completely ignoring these concepts has the potential to show students how to use these concepts in different contexts (Battista, 2007).

It was found that the majority of the mathematical concepts in the social studies textbook in the learning area of measurement were related to measuring time. In addition, it was observed that the concepts belonging to the sub-learning areas of measuring money and measuring length were relatively more common. Measurement is an important topic for different disciplines in terms of the application of mathematics in everyday life (Van de Walle et al., 2014). The predominance of the concept of measuring time in social studies courses reflects the importance of issues such as sequencing historical events, understanding the concept of time, and evaluating events in daily life within a time framework (Akbaba et al., 2012; Steffe & Thompson, 2000). The reason for including the topic of money in social studies is to draw attention to the basic mathematical skills needed to understand the historical and cultural development of economics and trade (Saxe, 1991). Including the concept of length measurement in a social studies textbook may be necessary to facilitate understanding of topics such as geographic scales, maps, and physical characteristics of regions (Liben & Downs, 1993).

It was observed that there were very few concepts belonging to the computing learning area in the social studies textbook, and these were limited to the data collection and evaluation sublearning area. Computing is an important subfield of mathematics and can help develop scientific reasoning, problem solving, and critical thinking skills (Franklin et al., 2007). The underrepresentation of this area in the social studies textbook may result in students not being adequately exposed to these skills. Including the data collection and analysis sub-area in the textbook may be intended to provide students with basic skills they can use to evaluate social events and phenomena (Watson, 2009). However, ignoring other aspects of data processing may leave this skill incomplete. However, students need to acquire the ability to read and interpret tables and graphs about social events and trends (Akgün, 2010; Akın-Köse, 2011; Mokros & Russell, 1995). For this reason, it is recommended that more space be given to the learning area of data processing in textbooks.

When all the learning areas in the mathematics curriculum were considered, it was found that the mathematical concepts in the social studies textbook were mostly related to the area of measurement. The second learning area was numbers and operations, the third was geometry, and the last was computing. Measurement is one of the foundational skills of mathematics and is frequently encountered in everyday life (NCTM, 2000). The fact that concepts such as time, length, and money are frequently covered in social studies may explain the predominance of measurement skills in this textbook. The fact that numbers and operations ranked second indicates that these concepts, which are the cornerstones of mathematics, also have an important place in social studies (Clements & Sarama, 2020). Focusing only on certain areas of mathematics in social studies courses may limit students' mathematical thinking skills. However, it is emphasized that different areas of mathematics are interrelated and should be considered as a whole (NCTM, 2000). Given the interdisciplinary nature of social studies, it is important to include different areas of mathematics in a balanced way (MoNE, 2018). In this way, students' critical thinking, problem solving, and decision-making skills can be developed in a multidimensional way.

The social studies textbook comprehensively covers mathematical concepts across multiple learning areas in the mathematics curriculum, with an emphasis on measurement, numbers and operations, and geometry. This objective analysis suggests that the social studies course reinforces essential mathematical skills.

Recommendations

- The study found that the mathematical concepts in social studies textbooks were significantly focused on the learning area of numbers and operations. In this regard, it is recommended that further research be conducted to determine how effective the social studies course is in teaching mathematical concepts.

- In the study, it was found that mathematical concepts related to the geometry learning area in social studies textbooks were especially concentrated in the sub-learning area of spatial relations. In this context, it is recommended to investigate the effect of geometry concepts in social studies textbooks on students' spatial thinking and their ability to associate with their environment.

- In the study, it was found that the mathematical concepts in social studies textbooks focused mainly on measuring time in the context of the measurement learning area. In this context, it is recommended to investigate the effect of the concepts of measuring time in the social studies course on students' understanding of the concept of time and their ability to use time in daily life. In addition, it is also important to evaluate how the concepts in the sub-learning areas of money measurement and length are taught in the social studies course and whether these concepts contribute to students' economic and spatial awareness. This type of research can reveal the contribution of interdisciplinary teaching approaches to student learning.

- The study found that there are a limited number of concepts related to the data processing learning area in social studies textbooks, and these concepts are mostly limited to the data collection and evaluation sublearning area. In this context, it is recommended to investigate whether giving more space to the computing learning area in social studies textbooks would positively contribute to students' interest and skills in data science and statistical reasoning.

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4. Sınıf Sosyal Bilgiler Ders Kitabında Yer Alan Matematiksel Kavramların İncelenmesi

Giriş

Farklı disiplinlerin birbiriyle ilişkilendirilmesi eğitimde geniş bir perspektif sunarak bu yaklaşımın kökeni tarihsel olarak derindir (Özaydınlı-Tanrıverdi & Kılıç, 2019). Disiplinler arası eğitim, birkaç disiplini veya alanı birleştirerek ilgili bilgi ve yöntemlerden yararlanmayı amaçlamaktadır (Jacobs, 1989). Bu yaklaşım, öğrencilere üst düzey öğrenme fırsatları sunmakta ve çeşitli boyutlarda (yatay, dikey ve deneyimsel) bağlantılar kurulmasını hedeflemektedir (Aladağ & Şahinkaya, 2013, s. 159). Özellikle 2000'li yıllardan itibaren bu konudaki ilgi ve yayınlar da artmıştır (Turna & Bolat, 2015).

Sınıf öğretmenleri, farklı disiplinlerde bir kavramın veya temanın uygulanabilirliğini kullanarak öğrencilere çoklu bakış açıları kazandırmayı hedeflemektedir (Anık, Ergül, & Üney, 2023; Aslan & Karakuş, 2016). Disiplinler arası öğretim, öğrencilere eleştirel düşünme, anlama ve problem çözme becerilerini geliştirirken, aynı zamanda bilişsel ilerlemeleri teşvik etmektedir (Baş, Tertemiz, & Tay, 2021; Demirel, & Coşkun, 2010). Bu yaklaşım, öğrencilerin konulara bütüncül bir perspektiften bakmalarını sağlamaktadır. Türkiye'de güncellenen öğretim programları, disiplinler arası becerilerin öğrencilere kazandırılmasına daha fazla vurgu yapmaktadır (Sezgin, Çarıkçı, & Öntaş, 2018).

Sosyal bilgiler ve matematik dersleri arasındaki disiplinler arası yaklaşım, öğrencilere eleştirel düşünme, problem çözme becerilerini kazandırır ve gerçek dünya sorunlarına karşı daha duyarlı hale getirme (Yıldız, 2021). Bu entegrasyon, öğrencilerin öğrenme deneyimlerini zenginleştirmekte ve onları bağlantılı bir dünyada başarılı olmaları için gerekli araçlarla donatmaktadır. Sosyal bilgiler ve matematik arasında haritalar, grafikler, bütçe planlaması gibi konularda disiplinler arası bağlantılar kurulabilir (Bekdemir & Başbüyük, 2011). Bu bağlantılar aracılığıyla öğrencilere matematiksel becerileri sosyal bilgilerde uygulama fırsatı sunmakta ve bütünsel bir öğrenme deneyimi sağlamaktadır (Pala & Başbüyük, 2019). Sosyal bilgiler ve matematik programlarındaki kazanımların diğer

disiplinlerle ilişkilendirilmesi öğretimde kritik bir öneme sahiptir (Milli Eğitim Bakanlığı [MEB], 2018a; 2018b).

Türkiye’de sosyal bilgiler ve matematik alanında matematik becerisinin harita okuma becerileri üzerinde etkisi (Pala ve Başbüyük, 2019); harita okuma becerisi (Ertuğrul, 2008; Sönmez, 2010); harita ve yön grafik okuma ve hazırlama becerisi (Akgün, 2010); sosyal bilgilerde istatistik ve grafik kullanım teknikleri (Akın-Köse, 2011); ölçek kullanma becerisi (İnel, 2011); zaman ve kronolojiyi anlama becerisi (Ablak ve Aksoy, 2021; Akbaba, Keçe ve Erdem, 2012; Kekeç, 2018) ve konum-koordinat belirleme becerisine yönelik (Kuşçu, 2011) çalışmalar yapılmıştır. Sosyal bilgiler programı ile matematik dersinin ilişkilendirilmesinin değerlendirilmesine yönelik ise çok az çalışmaya rastlanılmıştır (Aladağ & Şahinkaya, 2013; Şahinkaya & Aladağ, 2009). Türkiye özelinde dördüncü sınıf düzeyinde başlayan sosyal bilgiler dersinin matematik kavramları ile ilişkilendirilmesi öğretim programlarının disiplinler arası uyumunu ortaya çıkarabilmesi açısından önemlidir. Bu çalışmada da ilkökul 4. sınıf sosyal bilgiler ders kitabında bulunan matematik kavramlarını belirleyerek ilgili kavramların nasıl sunulduğunu ortaya koymak amaçlanmıştır. Bu amaç doğrultusunda çalışmada, hâlihazırda yürürlükte bulunan 2018 Sosyal Bilgiler Dersi Öğretim Programı’na göre hazırlanmış ilkökul 4. sınıf Sosyal Bilgiler ders kitabında yer alan matematiksel kavramların 2018 Matematik Dersi Öğretim Programı temelinde incelemesi yapılmıştır. Araştırmanın alt problemleri aşağıda sunulmuştur:

1. Sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki sayılar ve işlemler öğrenme alanına göre dağılımı nasıldır?
2. Sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki geometri öğrenme alanına göre dağılımı nasıldır?
3. Sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki ölçme öğrenme alanına göre dağılımı nasıldır?
4. Sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki veri işleme öğrenme alanına göre dağılımı nasıldır?
5. Sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki öğrenme alanlarına göre dağılımı nasıldır?

Yöntem

Çalışma, doküman analizi yöntemiyle yürütülmüştür. Doküman analizi, yazılı kaynakları sistemli bir şekilde inceleyerek bilgi toplama sürecidir ve eğitim araştırmalarında sıkça kullanılır (Bowen, 2009; Yıldırım & Şimşek, 2021). Çalışmada doküman analizinin tercih edilme nedeni araştırmanın problem cümlesinin öğretim programı ve öğretim materyali olan ders kitabı ile ilgili olması veri kaynağı olarak dokümanlara yönlendirmiştir. Araştırma problemine uygun olarak Millî Eğitim Bakanlığı Talim ve Terbiye Kurulu Başkanlığının 28 Mayıs 2018 tarih ve 78 sayılı kararı ile 2018-2019 öğretim yılından itibaren beş yıl okutulmak amacıyla kabul edilen ilkökul sosyal bilgiler ders kitabı ile 2018 yılından beri yürürlükte olan Matematik Dersi Öğretim Programı veri kaynağı olarak kullanılmıştır. İlkokul Sosyal Bilgiler Ders Kitabı Sami Tüysüz tarafından yazılmış ve 2022 yılında Tuna Matbaacılık tarafından basılmıştır. Araştırmanın yapıldığı 2022-2023 eğitim-öğretim yılında da ilgili ders kitabı kullanılmaya devam etmektedir. Doküman analizi, belirli bir sistematik yaklaşımla gerçekleştirilen bir nitel araştırma yöntemidir. Bu analizin başarılı bir şekilde uygulanabilmesi için belirli aşamaların takip edilmesi

önerilir. Araştırmanın veri kaynakları ve analizi, doküman analizinin uygulanışı ve bu süreçte izlenmesi gereken aşamalar doğrultusunda gerçekleştirilmiştir. Araştırma verileri iki ayrı uzman tarafından kodlanıp her kodlama karşılaştırılmıştır. Farklılıkların çözümü için üçüncü bir uzmandan görüş alınmış ve gerekli düzenlemeler yapılmıştır. Elde edilen verilerden hareketle araştırmanın güvenilirliği Miles ve Hubermann'ın (1994) formülü kullanılarak 0,95 olarak hesaplanmıştır.

Bulgular

Araştırmanın birinci bulgusunda; sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki sayılar ve işlemler öğrenme alanına göre dağılımı incelendiğinde, sayılar ve işlemlerle ilgili toplam 417 matematiksel kavram tespit edilmiştir. Bunların büyük çoğunluğunu (f=397) doğal sayılar alt öğrenme alanı oluşturmaktadır. Bunun yanı sıra en çoktan aza doğru sırasıyla doğal sayılarla toplama işlemi (f=8), doğal sayılarla çarpma işlemi (f=5), doğal sayılarla çıkarma işlemi (f=4), kesirler (f=2) ve doğal sayılarla bölme işlemi (f=1) alt öğrenme alanları da sosyal bilgiler ders kitabında yer almaktadır.

Araştırmanın ikinci bulgusunda; sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki geometri öğrenme alanına göre dağılımı incelendiğinde, geometri ile ilgili toplam 106 matematiksel kavram tespit edilmiştir. Bunların büyük çoğunluğunu (f=77) uzamsal ilişkiler alt öğrenme alanı oluşturmaktadır. Bununla birlikte geometrik cisimler ve şekiller (f=26) ve geometride temel kavramlar (f=3) alt öğrenme alanları da sosyal bilgiler ders kitabında yer almaktadır.

Araştırmanın üçüncü bulgusunda; sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki ölçme öğrenme alanına göre dağılımı incelendiğinde, ölçme ile ilgili toplam 485 matematiksel kavram tespit edilmiştir. Bunların büyük çoğunluğunu (f=365) zamanı ölçme alt öğrenme alanı oluşturmaktadır. Bunun yanı sıra en çoktan aza doğru sırasıyla paralarımız (f=79), uzunluk ölçme (f=25), tartma (f=9), alan ölçme (f=4) ve çevre ölçme (f=3) alt öğrenme alanları da sosyal bilgiler ders kitabında yer almaktadır.

Araştırmanın dördüncü bulgusunda; sosyal bilgiler ders kitabında yer alan matematiksel kavramların matematik dersi öğretim programındaki veri işleme öğrenme alanına göre dağılımı incelendiğinde, veri işleme ile ilgili toplam 19 matematiksel kavram tespit edilmiştir. Bu kavramlar da veri toplama ve değerlendirme (f=19) alt öğrenme alanında yer almaktadır.

Araştırmanın beşinci bulgusunda; sosyal bilgiler ders kitabındaki matematiksel kavramların matematik öğretim programındaki tüm öğrenme alanlarına göre genel dağılımına bakıldığında, en fazla ölçme (f=485), ikinci sırada sayılar ve işlemler (f=417), üçüncü sırada geometri (f=106) ve son olarak veri işleme (f=20) öğrenme alanlarıyla ilgili kavramların yer aldığı görülmektedir. Toplam 1027 matematiksel kavram tespit edilmiştir.

Tartışma ve Sonuç

Sosyal bilgiler ders kitabında yer alan matematiksel kavramların büyük çoğunluğunun sayılar ve işlemler öğrenme alanında olduğu görülmüştür. Özellikle doğal sayılar alt öğrenme alanında yoğunlaştığı tespit edilmiştir. Bunun yanı sıra doğal sayılarla toplama, çıkarma, çarpma ve bölme işlemleri ile kesirler konusuna ilişkin kavramlara da yer verildiği bulunmuştur. Bu sonuç, sosyal bilgiler dersinin sadece toplumsal konuları ele almadığını, matematiksel kavramları da içerdiğini

göstermektedir. Sosyal bilgiler dersinde matematiksel kavramların işlenmesi, öğrencilere çeşitli konuları farklı perspektiflerden değerlendirme fırsatı sunmaktadır. Nitekim, öğrencilere matematik dersinin diğer derslerle ilişkisini göstermenin, onların matematiğin gerçek dünyadaki önemini daha iyi anlamalarına yardımcı olabileceği vurgulanmıştır (Moyer-Packenham & Westenskow, 2013). Doğal sayılar ve işlemlerin yoğun olarak işlenmesi, bu kavramların günlük yaşamda ve toplumsal olaylarda sıkça karşımıza çıkmasından kaynaklanıyor olabilir. Örneğin; bir ülkenin nüfusu, ekonomik veriler veya tarihi olayların zamanlaması gibi konular matematiksel kavramları gerektirir (Stanic & Kilpatrick, 1989).

Sosyal bilgiler ders kitabındaki matematiksel kavramların geometri öğrenme alanı açısından dağılımı incelendiğinde, en fazla uzamsal ilişkiler alt öğrenme alanı ile ilgili olduğu görülmüştür. Geometrik cisimler ve şekiller ile geometride temel kavramlara ilişkin az sayıda kavramın yer aldığı tespit edilmiştir. Sosyal bilgiler kitaplarında geometriye yönelik kavramların yer alması, öğrencilere mekânsal düşünme ve çevreleriyle ilişkilendirme becerileri kazandırmak amacıyla olabilir. Özellikle “uzamsal ilişkiler” konusunun vurgulanması, öğrencilerin coğrafi konumlar, sınırlar, bölgeler ve yer şekilleri gibi konuları anlamalarına yardımcı olabilir (National Council of Teachers of Mathematics [NCTM], 2000). Uluslararası alanyazına bakıldığında, sosyal bilgiler eğitiminde uzamsal düşünmenin ve geometrik kavramların öğrencilere coğrafi ve tarihi olayları daha iyi anlamalarına yardımcı olduğu belirtilmiştir (Liben & Downs, 1993). Geometrik cisimler, şekiller ve temel kavramlarla ilgili az sayıda bilginin bulunması, bu kavramların sosyal bilgiler bağlamında daha az uygulanabilir olabileceği anlamına gelebilir. Oysa geometri, günlük yaşamdaki uzamsal ilişkileri anlama ve çevremizdeki cisimleri tanımlamada önemli bir role sahiptir (Van de Walle, Karp & Bay-Williams, 2014). Sosyal bilgiler öğretim programında yer-yön bulma, harita okuryazarlığı (Akgün, 2010; Pala ve Başbüyük, 2019) ve uzamsal düşünme gibi geometrik kavram ve becerilere sıklıkla yer verilmesine rağmen (MEB, 2018a), ders kitaplarındaki geometri içeriğinin sınırlı kaldığı söylenebilir.

Sosyal bilgiler ders kitabındaki matematiksel kavramların ölçme öğrenme alanı açısından büyük çoğunluğunun zamanı ölçme ile ilgili olduğu belirlenmiştir. Ayrıca paralarımız ve uzunluk ölçme alt öğrenme alanlarına ait kavramların nispeten daha fazla yer aldığı görülmüştür. Ölçme, matematiğin günlük yaşamdaki uygulamalarını içermesi bakımından farklı disiplinler açısından önemli bir konudur (Van de Walle et al., 2014). Zamanı ölçme kavramının sosyal bilgiler dersinde ağırlıklı olması, tarihsel olayların sıralaması, zaman kavramının anlaşılması ve günlük yaşantıdaki olayların zaman çerçevesinde değerlendirilmesi gibi konuların önemini yansıtmaktadır (Akbaba, Keçe, & Erdem, 2012; Steffe & Thompson, 2000). Paralarımız konusunun sosyal bilgilerde yer almasının nedeni, ekonomi ve ticaretin tarihsel ve kültürel evriminin anlaşılması için gerekli olan temel matematiksel becerilere dikkat çekmektir (Saxe, 1991). Uzunluk ölçme kavramının sosyal bilgiler ders kitabında bulunması, coğrafi ölçekler, haritalar ve bölgelerin fiziksel özellikleri gibi konuların anlaşılmasını kolaylaştırmak için gerekli olabilir (Liben & Downs, 1993).

Sosyal bilgiler ders kitabında veri işleme öğrenme alanına ait çok az sayıda kavram olduğu, bunların da veri toplama ve değerlendirme alt öğrenme alanıyla sınırlı kaldığı görülmüştür. Veri işleme, matematiğin önemli bir alt dalı olup bilimsel düşünme, problem çözme ve eleştirel düşünme becerilerinin geliştirilmesine yardımcı olabilir (Franklin et al., 2007). Sosyal bilgiler ders kitabında bu alanın yetersiz temsil edilmesi, öğrencilerin bu becerilere yeterince maruz kalmamasına neden olabilir. Veri toplama ve değerlendirme alt öğrenme alanının ders kitabında yer alması, öğrencilere toplumsal

olayları ve olguları değerlendirirken kullanabilecekleri temel becerileri kazandırma amacı güdebilir (Watson, 2009). Ancak veri işlemenin diğer yönlerinin göz ardı edilmesi, bu becerinin eksik kalmasına neden olabilir. Oysaki öğrencilere toplumsal olayları ve eğilimleri tablo ve grafik okuma ve yorumlama yeteneği kazandırılması gerekmektedir (Akgün, 2010; Akın-Köse, 2011; Mokros & Russell, 1995). Bu nedenle ders kitaplarında veri işleme öğrenme alanına daha geniş yer verilmesi önerilmektedir.

Sosyal bilgiler ders kitabındaki matematiksel kavramların matematik öğretim programındaki tüm öğrenme alanları dikkate alındığında, en fazla ölçme alanıyla ilgili olduğu tespit edilmiştir. İkinci sırada sayılar ve işlemler, üçüncü sırada geometri, son sırada ise veri işleme öğrenme alanları yer almaktadır. Ölçme, matematiğin temel becerilerinden biridir ve günlük yaşantıda sıkça karşımıza çıkmaktadır (NCTM, 2000). Sosyal bilgilerde zaman, uzunluk, para gibi kavramların sıkça işlenmesi, ölçme becerilerinin bu ders kitabında ağırlıklı olarak ele alınmasını açıklayabilir. Sayılar ve işlemler konusunun ikinci sırayı alması, matematiğin temel taşlarından olan bu kavramların sosyal bilgilerde de önemli bir yer tuttuğunu gösterir (Clements & Sarama, 2020). Sosyal bilgiler derslerinde matematiğin sadece belirli alanlarına odaklanması, öğrencilerin matematiksel düşünme becerilerini sınırlayabilir. Sosyal bilgilerin disiplinler arası yapısı düşünüldüğünde, matematik farklı alanlarına dengeli bir şekilde yer verilmesi önem kazanmaktadır (MEB, 2018). Böylelikle öğrencilerin eleştirel düşünme, problem çözme ve karar verme becerileri çok yönlü olarak geliştirilebilir.

Sonuç olarak, sosyal bilgiler ders kitabı, matematik dersi öğretim programındaki pek çok öğrenme alanına ait matematiksel kavramları bünyesinde barındırmaktadır. Özellikle ölçme, sayılar ve işlemler ile geometri konuları yoğun olarak yer almaktadır. Bu durum sosyal bilgiler dersinin matematik becerilerini destekleyici nitelikte olduğunu göstermektedir.

Öneriler

Araştırmada sosyal bilgiler ders kitaplarında yer alan matematiksel kavramların belirgin bir şekilde sayılar ve işlemler öğrenme alanına yoğunlaştığı bulgusu tespit edilmiştir. Bu bağlamda, sosyal bilgiler dersinin matematiksel kavramların öğretiminde ne kadar etkili olduğunu belirlemek amacıyla bir araştırma yapılması önerilmektedir.

Araştırmada sosyal bilgiler ders kitaplarında geometrik kavramların özellikle uzamsal ilişkilerde yoğunlaştığı tespit edilmiştir. Bu kavramların öğrencilerin mekânsal düşünme becerilerine etkisinin incelenmesi önerilmektedir.

Araştırmada sosyal bilgiler ders kitaplarında ölçme öğrenme alanı bağlamında özellikle zamanı ölçme konusunda yoğunlaştığı bulgusu tespit edilmiştir. Bu bağlamda, öğrencilerin zaman kavramına ilişkin anlayışlarına ve günlük yaşamda zamanı kullanma becerilerine etkisinin incelenmesi önerilmektedir.

Araştırmada veri işleme kavramlarına sınırlı yer verildiği belirlenmiştir. Sosyal bilgilerde veri işleme kavramlarına daha fazla yer vermenin öğrencilere olan olası katkıları araştırılabilir. Sınıf öğretmenleri ders kapsamında bu öğrenme alanına yönelik dikkat çekebilir.