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Research Article

Examination of Primary and Secondary School Mathematics Textbooks in Terms of Root Values

Ramazan DİVRİK [1], Mustafa Zeki AYDOĞDU [2]

[1] Trakya University, Faculty of Education, Edirne/Türkiye, ramazandivrik@trakya.edu.tr, http://orcid.org/0000-0002-7126-7664

[2] Trakya University, Faculty of Education, Edirne/Türkiye, mzekiaydogdu@trakya.edu.tr, http://orcid.org/0000-0003-1163-2890

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Abstract – This study was conducted to examine mathematics textbooks in terms of the root values in the curriculum. For this purpose, 8 mathematics textbooks taught in primary and secondary schools in the 2022-2023 academic year were examined regarding root values. Document analysis method, one of the qualitative research methods, was used in the study. The identified textbooks were subjected to first-read by the researchers, and the expressions thought to contain value statements were identified. The study observed that the number of root values in elementary school mathematics textbooks decreased as the grade level increased. In primary school textbooks, the value of responsibility is the most common, and the value of honesty is the least common. In middle school mathematics textbooks, root values decrease as the grade level increases (except sixth grade). While responsibility and benevolence are the most common values in middle school textbooks, respect is the least common. According to these results, it is recommended that primary and secondary school mathematics textbooks should include a greater number and variety of value statements and that textbooks should be prepared with an equal distribution of these values according to grade levels and values.

Keywords: Mathematics textbook, primary school, secondary school, root values.

Corresponding author: Ramazan DİVRİK, Trakya University, Faculty of Education, Primary School Department

Introduction

Since man is a social being, he maintains his ties with his culture and other societies in the world through rules and cultural elements to create harmony between many equations in his life and ensure his continuity. One of these elements is values (Ergül, 2019). Value is defined in the dictionary as “an abstract measure used to determine the importance of

something, the value of something; magnificence, might, worth" (Turkish Language Association [TLA], 2023). Cevizci (2006) explained value as a basis of belief and facts that are important for making sense of life and shaping daily life. On the other hand, Bacanlı and Dombay (2012) stated that value could be accepted as a belief belonging to our internal structure that serves as a source of behaviours and helps to judge them. "Values are meaningful concepts that try to teach individuals, who are the building blocks of society, what is important and what kind of behaviour should be preferred in which situations" (Topal, 2019: 248). Individuals living in a society form their value judgments by adopting the values accepted in the society. These value judgments formed by individuals lead to the emergence of society's values (Gerekten, 2018). Values and society are intertwined phenomena that cannot be separated like flesh and nail.

People try to distinguish right from wrong based on traditions, custom, and social rules; within this framework, they form a measure of moral rules. This measure encompasses a set of beliefs that can also be called values or educational values. The fact that individuals evaluate the events they encounter throughout their lives and the people and phenomena around them within the framework of this conviction constitute a principle of behaviour. This principle is the general name of the order approved by the society and covers a nation's material and spiritual elements. These phenomena, which may vary from society to society, may become an acquisition over time. Permanentisation of values is possible with adult and peer support based on social learning. The first step in becoming an individual who can think healthy and has a conscious thinking ability is through a qualified values education (Ay & Topçuğlu Ünal, 2020).

Since individuals are a part of the society they live in, they interact with the society. The individual is a being that influences and is influenced by the society in which he/she lives. Transferring society's values and common behaviour patterns to the individual and internalizing them enables the individual to adapt to society and see himself/herself as a part of society. Values have existed since the past, and adding new ones to the values from the past provides a bridge between the past and the future. The strength and continuity of a society are directly related to this bridge. It is not possible to talk about the future of a society that has broken away from its past and destroyed the bridge between it and its past. For this reason, values teaching should not be left to chance. The most potential institutions that can do this work systematically and carefully are our schools (Erdal, 2019). While values can be acquired through language, systematic teaching is needed for these values to become permanent and

sustainable. It would be useful to utilize schools for this need. “Being a good and virtuous person and raising individuals with strong character is one of the most important goals of school and society. Realizing this goal depends on transferring social and cultural values to future generations” (Karatay, 2011: 1441).

The future of a society is only possible if the future generations of that society protect their values. Based on this, especially formal education schools should endeavour to provide students with society's values and make it an important goal to give the students values (Sallabaş & Dağ, 2020). Especially during the compulsory education process, our values should be given to students both implicitly and directly, and it should be ensured that our values are passed on to future generations. Here, every element of education, such as parents, students, teachers, and administrators, must do their part, otherwise, teaching these values will become more difficult day by day, and one day they will disappear.

The acceleration of technological developments in the developing and changing world has facilitated the communication of societies with each other and the transfer of their cultures to each other. Since values may vary according to society, a value considered important in one society may not be welcomed in another society (Yaman, 2016). The easy transfer of values from society to society sometimes leads to changes in our society. It may cause our future generations to grow up without learning our own values or to grow up with values that do not coincide with our society. For this reason, it is important to provide values education to our students in education. Values education aims to raise individuals in line with common and acceptable behaviours in society. Values education aims to reduce societal conflicts and problems, ensure society's continuity, and provide a regular and systematic future for future generations (Ay & Topçuğlu Ünal, 2020). Values education aims to raise good individuals who are moral, have a well-established personality, are self-confident, and aim to benefit both their society and the world. Another issue to be considered in values education is that people transform the information they learn into behaviour in their lives. The main goal of values education should be to recognize and understand oneself and maximize these abilities while going through these processes. In values education, the importance of basic values in people's relations with others should also be emphasized (Çağlayan, 2006). An individual who has received values education well and internalized these values will struggle not only for his/her happiness but also for the happiness of society by adopting individual values such as respect, love, and freedom to live and social values such as love for humanity, love for homeland and nation (Salar, 2011).

Researchers state that values education has become a need rather than being important (Yaman, 2016). The acquisition of basic values by students is of critical importance both in social life and in the student's life success. Based on this importance, activities within the scope of values education are included in schools (Ginesar & Katılmış, 2021). The Ministry of National Education (MoNE) has been including values education in education curriculum since 2005. In 2010, studies on values education gained momentum and values education became one of the important components of the 2018 curriculum that is still in use today (Gerekten, 2018). In the 2018 curriculum, MoNE stated that it does not see values as a separate program or learning area, subject, or unit. On the contrary, values are the main purpose and spirit of the education process. Based on this, values are included in the education programs of all courses regardless of branch. These root values are 10 and are listed as follows: justice, friendship, honesty, self-control, patience, respect, love, responsibility, patriotism, and helpfulness.

It is undeniable that mathematics is the most important course for most students throughout their education, due to society's difficulties and pressure. For this reason, giving the right place to values education in the mathematics course, perhaps the most important course for students, will enable them to understand the importance of values education. Values education can be included in many stages of mathematics teaching. While motivating the students to the lesson, while explaining the subject, while doing activities with the students, and/or in the measurement and evaluation part of the lesson, these root values in our education and training program can be included. One of the important parts of education is course materials. Among these course materials, textbooks are the ones that all students have. Textbooks are the most basic educational tool used in schools to achieve the goals and objectives in the curriculum and to transfer the learning outcomes, concepts, values, and skills to students (Hussain, 2012). Textbooks, the main source of information for teachers and students, are the most widely used course materials in our country, as in many countries (Kılıç & Seven, 2007). Although visual, auditory, and printed technological teaching tools have started to be used in schools with the development of technology, most teachers still rely on textbooks for their daily lesson plans or activities (Elliott, 1992; Gibson, 2012; Woodward, 1993). While textbooks guide teachers on what to teach, they also help students gain certain skills, such as following the learning outcomes, practicing exercises, and self-evaluation (Brousseau, 1986; Demirkaya, 2013; Johansson; 2003; Kayabaşı, 2003; Semerci, 2004). Şen (2008) stated that textbooks provide students' language and cognitive development and also

have an important role in the formation of students' personalities. It is thought that books prepared for children have important effects on their character development and that individuals should be fed with books suitable for their character traits from the beginning of primary school to the end of secondary school (Sever, 2008). Therefore, the content in the textbooks must be rich, contain examples from daily life, visual expressions must be frequently used, the language must be understandable, and it must effectively convey the values specified in the curriculum (Güven, 2010; Korkmaz et al., 2020). It is essential that textbooks, frequently used in applied courses such as mathematics, are well-prepared and provide students with quality content. Because all knowledge students acquire through textbooks is considered an essential gain for society (Dane et al., 2004). Therefore, it is important to investigate to what extent and how values education is included in primary and secondary school mathematics textbooks.

In the literature review, there are studies in which Turkish (Durhat & Ökten, 2020; Eken & Öksüz, 2019; Şen, 2008) Science (Yılmaz & Kıran, 2023) and Social Studies textbooks (Kuş et al., 2013) were examined in the context of values education. When the studies examining mathematics textbooks are concerned, it is seen that these studies were reviewed in terms of features such as technological suitability (Sevimli & Kul, 2015), abstraction skills (Kılıçoğlu, 2020), mathematical proof (Zeybek et al., 2018), history of mathematics (Mersin & Durmuş, 2018). In addition, Korkmaz et al. (2020) examined mathematics textbooks according to their suitability for the High School Entrance Examination (LGS), active use in the teaching process, and suitability for the curriculum applied in schools. There have also been studies examining fifth grade mathematics textbooks in Turkey and Singapore in terms of solved examples and questions and according to PISA basic mathematics skill levels (Şirin & Yıldız, 2020; Toprak & Özmantar, 2019). When the studies examining mathematics textbooks in terms of values education are concerned, although there are studies examining primary school third and fourth grade books (Uzunkol & Karaca, 2019), secondary school mathematics textbooks (Horzum & Yıldız, 2023; Özenç, 2019; Sayın et al., 2019; Şahin & Başgül, 2018) and secondary mathematics textbooks (Teker & Ellez, 2022) in terms of values education, there is no research examining all mathematics textbooks at primary and secondary school level. In this context, this study aims to examine the root values in mathematics textbooks of primary (first, second, third and fourth grades) and secondary schools (fifth, sixth, seventh and eighth grades). In line with this purpose, answers to the following problems were sought.

1. How is the distribution of root values in primary school mathematics textbooks?
2. How does root values distribution in primary school mathematics textbooks according to learning areas?
3. How is the distribution of root values in secondary school mathematics textbooks?
4. How does root values distribution in secondary school mathematics textbooks according to learning areas?

Method

Study Model

Document analysis is a qualitative research method preferred for systematically analysing written, visual and auditory documents to make sense of the data obtained or to understand the subject (Corbin & Strauss, 2008; Wach & Ward, 2013). This study preferred this method because primary and secondary school mathematics textbooks, which are written documents, were analysed in terms of the root values they contain.

Study Document

In the study, 8 textbooks, one at each grade level, were selected from the textbooks of private publishers determined by the Ministry of National Education to be taught in primary and secondary schools in the 2022-2023 academic year. These textbooks were selected because they were being taught in the city where the first author worked at the time of the study. Detailed information about the analysed textbooks is presented in Table 1.

Table 1 Information on primary and secondary school mathematics textbooks examined within the scope of the study

Class	Book Name	Publisher	Authors	Number of Pages
First Grade	Primary School Mathematics Textbook First Grade	Açılım Education and Training	Nuri Cantürk	208
Second Grade	Primary School Mathematics Second Grade Textbook	Pasifik Publishing	Ayşegül Arzu Bayram	240
Third Grade	Primary School Mathematics 3 Textbook	Tuna Printing	Orhan Bilen	272
Fourth Grade	Primary School Mathematics 4 Textbook	Sevgi Publishing	Ekrem Aydin, Mehmet Ali Erenkuş	248

Fifth Grade	Secondary and Imam Hatip Secondary School Mathematics Textbook Fifth Grade	Özgün Printing	Gülçin Göksülük	264
Sixth Grade	Secondary and Imam Hatip Secondary School Mathematics Textbook Sixth Grade	Koza Publishing	Ekrem Aydın, Mehmet Ali Erenkuş	246
Seventh Grade	Middle School and Imam Hatip Secondary School Mathematics Textbook Seventh Grade	Berkay Publishing	Bülent Akbulut	256
Eighth Grade	Secondary School and Imam Hatip Secondary School Mathematics 8 Textbook	Koza Publishing	Mehmet Ali Erenkuş, Didem Eren Savaşkan	276

Data Collection

In this study, mathematics textbooks were analysed in terms of root values, firstly, the textbooks to be included in the study were determined. The determined books consist of 8 sets of textbooks belonging to private publishing houses that are approved to be taught by the Ministry of National Education in the 2022-2023 academic year and are currently used as textbooks. After the textbooks were obtained in both physical and digital media, they were read twice by the researchers at different times for the purpose of the study and associated with the value statements. The root values used in associating value statements with root values and the information about the attitudes and behaviours associated with these values are given in Table 2 (Presidency of the Board of Education [PoBE], 2017: 22). Afterwards, the researchers came together at certain times. They discussed the values determined by both researchers and the statements corresponding to these values, and it was decided to gather the statements under appropriate value headings.

Table 2 Root values in the curriculum and attitudes and behaviours related to values

Root Values	Attitudes and Behaviours Related to Root Values
Responsibility	Being responsible to oneself, one's environment, family, and homeland; keeping one's word, being consistent and reliable; taking the consequences of one's actions...
Affection	Expressing love appropriately, making sacrifices, being trusting, compassionate, caring about family unity, being altruistic, being loyal...
Friendship	Altruism, trust, understanding, solidarity, loyalty, faithfulness, charity...
Benevolence	Being generous, cooperating, compassionate, hospitable, sharing, solidarity, offering support...
Justice	Fairness, equal treatment, sharing...
Patience	Being determined, enduring, knowing how to wait, being resilient and durable, persevering...
Honesty	To be clear and understandable, to be truthful, to be decent and stable, to be reliable, to keep promises...

Self-audit	Controlling behaviours, taking responsibility for their behaviour, having self-confidence, apologizing when necessary...
Respect	Humility, treating others how one would like to be treated, valuing other people's personalities, considering the interlocutor's position, characteristics, and situation...
Patriotism	Being hardworking and productive, solidarity, obeying rules and laws, being loyal, being sensitive to historical and natural heritage, caring about society, being participatory...

Analysis of Data

Primary and secondary school mathematics textbooks were first-read by the researchers, and the expressions in the textbooks that were thought to contain the concept of value were determined. The identified statements were independently associated with root values by both researchers. Then, the researchers came together and checked each value-containing statement one by one from the textbooks. The values on which consensus was reached were taken as they were. The value statements that could not be agreed upon or that one researcher identified as a value statement, but the other researcher did not, were examined together. As a result of the examination, the statements containing undecided values were also associated with a value resulting from a joint decision. In this way, the inter-coder agreement rate was calculated based on the expressions containing values for which consensus was reached or for which consensus could not be reached. As a result, the inter-coder agreement was calculated as 0.89 $(Consensus/Consensus+Disagreement)\times 100$ (Miles & Huberman, 1994).

Validity and Reliability

The validity and reliability provided by numerical indicators in quantitative research are done differently in qualitative research. In qualitative research, it is necessary to ensure credibility for internal validity, transferability for external validity, consistency for internal reliability, and confirmability for external reliability (Yıldırım & Şimşek, 2006). In this context, the measures taken to ensure validity and reliability in the research are as follows.

- The research process was planned and explained in detail by the researchers.
- Both researchers had long-term interactions with the textbooks.
- To ensure the consistency of the data sets created by the researchers, the researchers examined the textbooks more than once at different times, and the results were checked together.
- The researchers keep the textbooks and the raw data sets created digitally.

- The findings obtained after data analysis were supported with numerical data (percentage, frequency).
- Examples of the findings obtained from the textbooks are shown.
- The agreement rate between the researchers for the obtained data was calculated.

Findings

Findings related to the first sub-problem of the study

In the first sub-problem of the research, the findings obtained from the examination of primary school mathematics textbooks in terms of root values are given in Table 3.

Table 3 Root values in elementary school mathematics textbooks and their frequency of inclusion

Value	First Grade	Second Grade	Third Grade	Fourth Grade	f (%)
Responsibility	19	7	20	12	58 (23%)
Affection	1	11	4	7	23 (9.13%)
Friendship	4	5	10	1	20 (7.94%)
Benevolence	13	7	5	7	32 (12.7%)
Justice	2	4	8	1	15 (5.95%)
Patience	7	8	8	8	31 (12.3%)
Honesty	-	1	1	2	4 (1.59%)
Self-audit	3	11	5	2	21 (8.33%)
Respect	17	8	1	7	33 (13.1%)
Patriotism	4	5	4	2	15 (5.96%)
Total	70	67	66	49	252

When Table 3 is examined, 252 expressions containing value were identified in primary school mathematics textbooks. The textbook with the highest number of these value statements was the first grade textbook with 70 value statements. The first grade textbook is followed by the second grade textbook with 67 value statements and the third grade textbook with 66 value statements. The textbook with the least number of value statements is the fourth grade textbook with 49 value statements.

Responsibility is the most common value in primary school mathematics textbooks, with 58 (23%). This value is followed by respect with 33 (13.1%), benevolence with 32 (12.7%), patience with 31 (12.3%), love with 23 (9.13%), self-control with 21 (7.94%), friendship with 20 (7.94%), justice and patriotism with 15 (5.96%) each. The least common value is honesty, with 4 (1.59%). The results and examples of analysis for each value in the textbooks according to grade levels are given below.

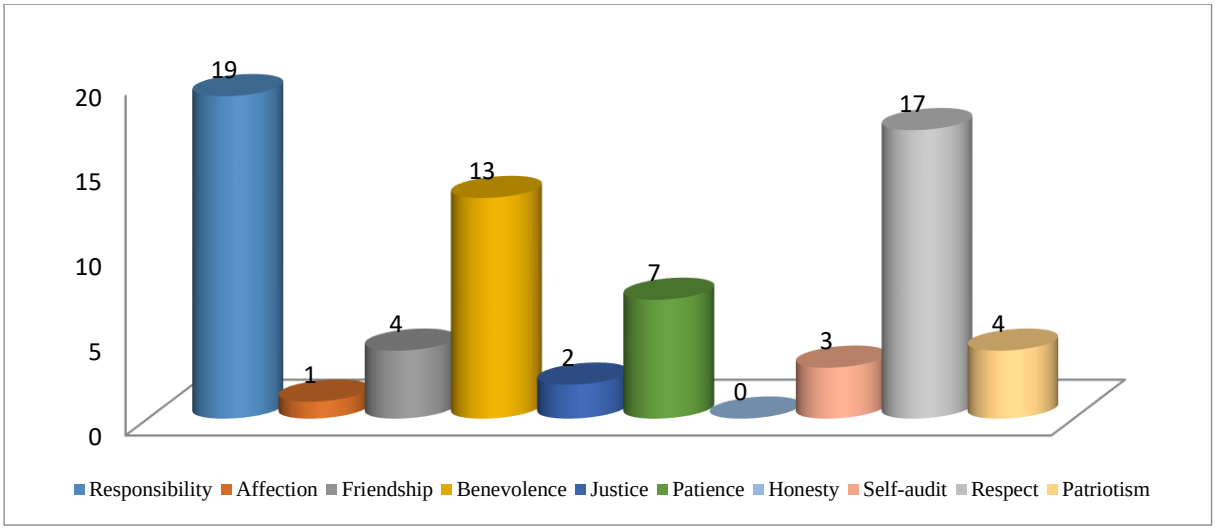


Figure 1 Values in the first grade mathematics textbook

According to the frequency graphic of the values in the first grade mathematics textbook, the most common value was responsibility, with 19 (27.1%). Responsibility is followed by respect with 17 (24.3%), benevolence with 13 (18.6%), patience with 7 (10%), friendship and patriotism with 4 (5.7%) each, self-control with 3 (4.3%) and justice with 2 (2.9%). The least common value was love, with 1 (1.4%). The expression, including the value of honesty, was not found in the textbook. An example of the value of respect in the first grade mathematics textbook is presented below.

Turkish	English
 Annesi, Alíye buzdolabında kaç tane yumurta olduğunu soruyor. Ali, buzdolabındaki yumurtaların sayısını nasıl bulabilir? Tartışınız. Söylenilen fikirlere katılmasanız da saygı gösteriniz.	His mother asks Ali how many eggs there in the fridge are. How can Ali find the number of eggs in the refrigerator? Make a discussion. Show respect even if you disagree with the ideas expressed.

Figure 2 The value of respect in the first grade mathematics textbook

In preparation for the topic in Unit 2 (p. 36) of the first grade mathematics textbook, it is explained that even if one disagrees with the ideas expressed during the discussion, one should value and respect the personalities of those people.

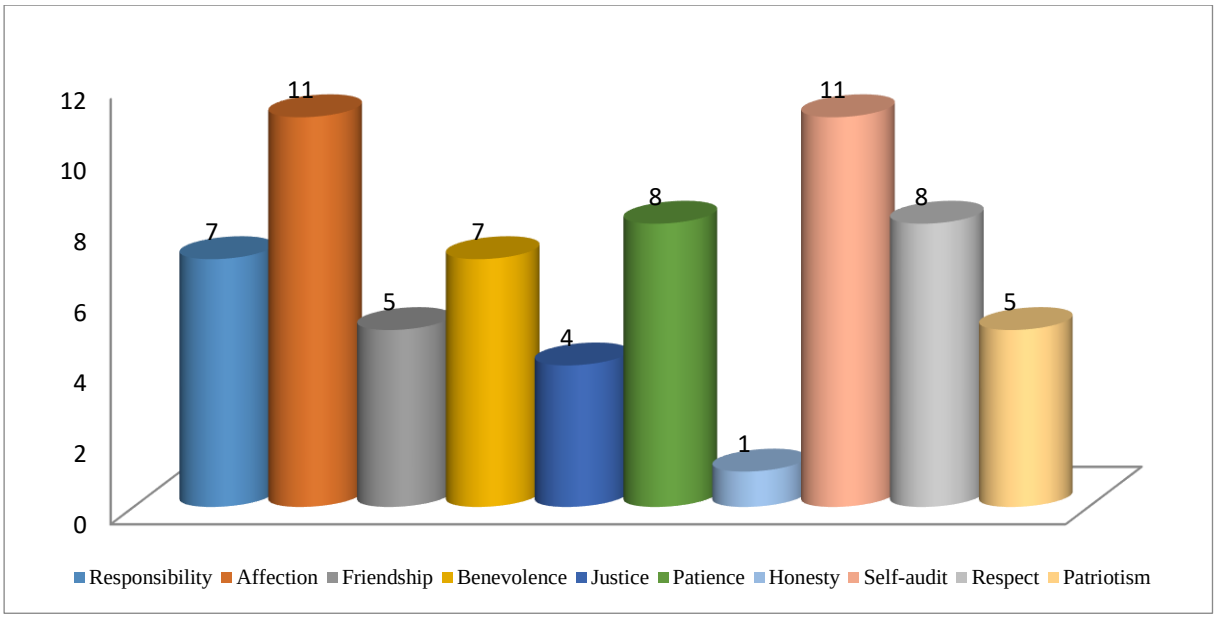
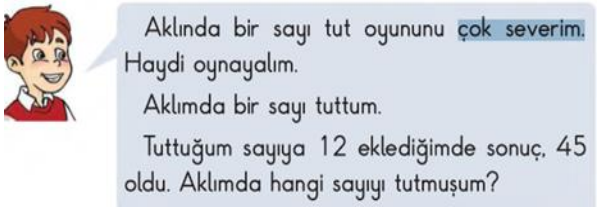


Figure 3 Values in the second grade mathematics textbook

According to the frequency graphic of the values in the second grade mathematics textbook, the most common values were love and self-control, with 11 (16.4%) each. This is followed by the values of patience and self-control with 8 (11.9%) each, responsibility and benevolence with 7 (10.5%) each; friendship and patriotism with 5 (7.5%) each; and justice with 4 (6%). The least common value was honesty, with 1 (1.5%). An example of the value of love in the second grade mathematics textbook is presented below.



I like to play to keep a number in mind. Let's play.
I have a number in my mind.
When I added 12 to the number I kept, I got the result as 45. Which number did I hold in my mind?

Turkish English

Figure 4 The value of love in the second grade mathematics textbook

In Unit 2 (p. 68) of the second grade mathematics textbook, in the section where short information and explanations on the subject are given with various questions, the student who made a speech expressed his love appropriately by saying that he loved the number-keeping game very much. This expression emphasizes the value of love.

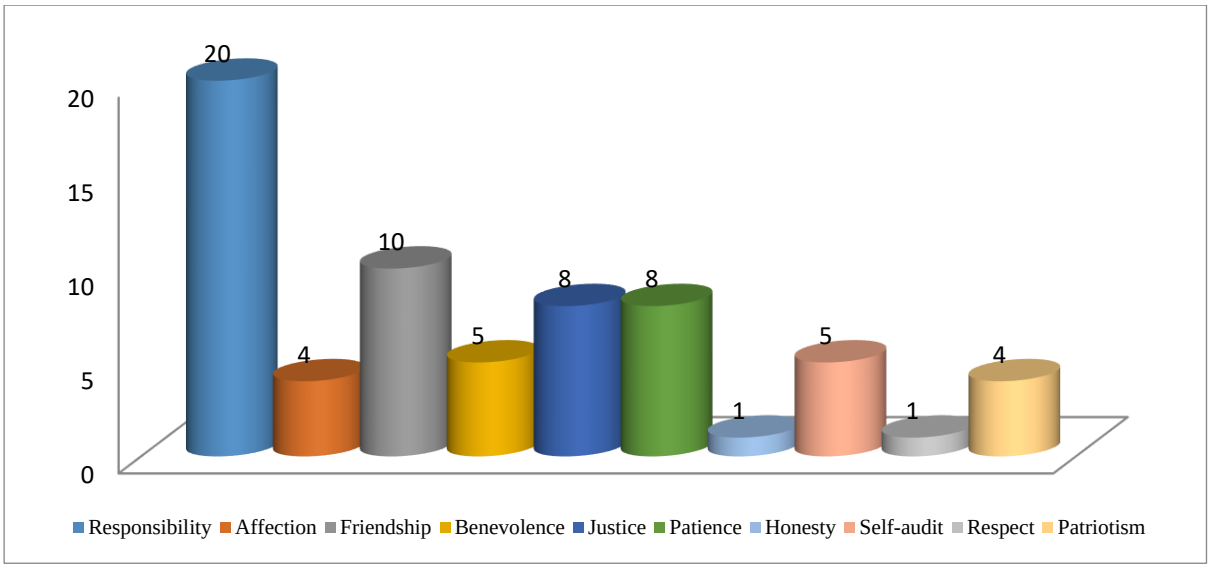


Figure 5 Values in the third grade mathematics textbook

According to the frequency graphic of the values in the third grade mathematics textbook, the most common value was responsibility, with 20 values (30.3%). The values of friendship with 10 (15.2%), justice and patience with 8 (12.1%), benevolence and self-control with 5 (7.6%), and love and patriotism with 4 (6%) each. The least common values were honesty and respect, with 1 (1.5%) each. An example of the value of justice in the third grade mathematics textbook is presented below.

Selim ile Seda'nın annesi yaptığı kurabiyelerden her tabağa dörder tane koyarak Selim ile Seda'ya verdi. Selim ile Seda kurabiyeleri çok beğenince Selim'e 2, Seda'ya ise 3 kurabiye daha verdi. Hangisine tek sayıda, hangisine çift sayıda kurabiye verdi?

Turkish

Seda's mother put four cookies on each plate and gave Selim and Seda. When Selim and Seda liked the cookies very much, she gave 2 more cookies to Selim and 3 more cookies to Seda. Which of them received an odd number of cookies, and which received an even number?

English

Figure 6 The value of justice in the third grade mathematics textbook

In Unit 1 of the third grade mathematics textbook (p. 37), in the section with questions measuring readiness for the subject, the mother's placing four cookies on each plate is an example of equal sharing and can be shown as an example of the value of justice.

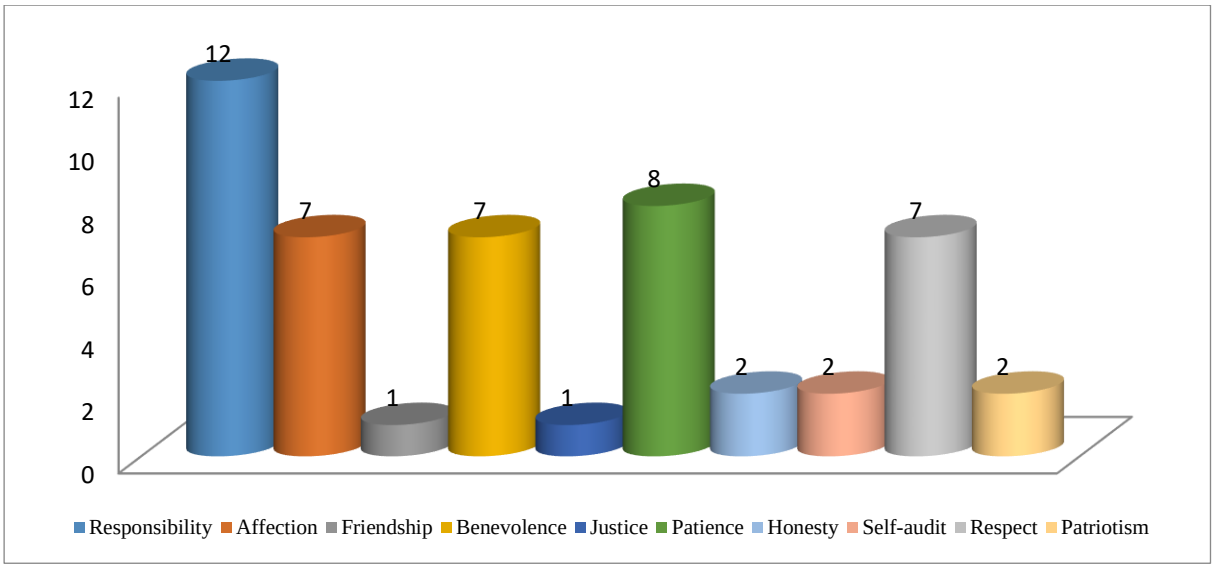


Figure 7 Values in the fourth grade mathematics textbook

According to the frequency graphic of the values in the fourth grade mathematics textbook, the most common value in the textbook was responsibility, with 12 (24.5%). Responsibility is followed by patience with 8 (16.3%); love, helpfulness, and respect with 7 (14.3%) each; and honesty, self-control, and patriotism with 2 (4.1%) each. The least common values were friendship and justice, with 1 (2%) each. An example of the value of patience in the fourth grade mathematics textbook is presented below.

Ahmet ile arkadaşları, bir filmi izlemek için bilet kuyruğunda sabırla bekleyip biletlerini aldılar. Film izlenirken sinema salonundaki 324 koltuktan 86 tanesi boş kaldı. Filmi izleyenlerin kaç kişi olduğunu tahmin edelim. 324 ve 86'yı en yakın onluğa yuvarlayarak çıkarma işlemini yapalım. 324 → 320 86 → − 90 230 kişi filmi izlemiştir. 	Ahmet and his friends waited patiently in line for tickets to see a movie and bought their tickets. While watching the movie, 86 of the 324 seats remained empty. Let's estimate how many people watched the movie. Let's subtract 324 and 86 by rounding to the nearest decimal.
Turkish	English

Figure 8 The value of patience in the fourth grade mathematics textbook

In Unit 3 of the fourth grade mathematics textbook (p. 58), in the section where an example of the subject is shown, children waiting in line to watch a movie exemplify the value of patience.

Findings related to the second sub-problem of the study

In the second sub-problem of the study, the findings regarding the distribution of root values in primary school mathematics textbooks according to learning areas are given in Table 4.

Table 4 Distribution of values in primary school mathematics textbooks according to learning areas

First Grade		Second Grade		Third Grade		Fourth Grade	
Learning Area	f (%)	Learning Area	f (%)	Learning Area	f (%)	Learning Area	f (%)
Numbers and Operations	41 (53.2)	Numbers and Operations	43 (64.1)	Numbers and Operations	36 (54.6)	Numbers and Operations	26 (53.1)
Geometry	13 (16.9)	Geometry	5 (7.5)	Geometry	1 (1.5)	Geometry	6 (12.2)
Measurement	20 (26)	Measurement	14 (20.9)	Measurement	28 (42.4)	Measurement	11 (22.5)
Data Processing	3 (3.9)	Data Processing	5 (7.5)	Data Processing	1 (1.5)	Data Processing	6 (12.2)
Total	77	Total	67	Total	66	Total	49

When Table 4 is examined, there are 77 values in the learning areas of the first grade mathematics textbook. Since 5 of these values were included as explanations in the unit evaluation section, they were included in more than one learning area. Therefore, the 70 values identified in the first grade mathematics textbook are seen as 77 in the table of learning areas. For example, the value of patience in the statement “Answer the following questions patiently after reading and understanding them to the end.” on page 172 is included as an explanation in the “Let's Evaluate the Unit” section of Unit 5. Since this unit covers numbers and operations, measurement, and geometry, this value expression is shown in all three learning areas. This is not the case in other classes.

According to these explanations, the first grade mathematics textbook values are mostly included in the learning area of numbers and operations, with 41 values (53.2%). The learning area of numbers and operations is followed by measurement and geometry, with 20 (26%) and 13 (16.9%) values, respectively. In contrast, data processing is the learning area with the least number of values, with 3 values (3.9%). The values in the second grade mathematics textbook are mostly found in the learning area of numbers and operations, with 43 values (64.1%). The numbers and operations learning area is followed by measurement with 14 values (20.9%), geometry and data processing learning area s with 5 values (7.5%) each. The values in the third grade mathematics textbook are mostly found in the learning area of numbers and operations, with 36 values (54.6%). The numbers and operations learning area is followed by

the measurement learning area with 28 values (42.4%), while geometry and data processing learning areas have 1 value each (1.5%). The values in the fourth grade mathematics textbook are mostly found in the numbers and operations learning area, with 26 values (53.1%). The numbers and operations learning area is followed by the measurement learning area with 11 values (22.5%), while geometry and data processing learning area s have 6 values (12.2%) each.

Findings related to the third sub-problem of the study

In the third sub-problem of the research, the findings obtained from examining secondary school mathematics textbooks in terms of root values are given in Table 5.

Table 5 Root values in middle school mathematics textbooks and their frequency of inclusion

Value	Fifth Grade	Sixth Grade	Seventh Grade	Eighth Grade	f (%)
Responsibility	6	4	10	3	23 (16.6%)
Affection	10	6	4	8	28 (20.1%)
Friendship	4	8	3	2	17 (12.2%)
Benevolence	7	5	5	6	23 (16.6%)
Justice	7	3	-	1	11 (7.9%)
Patience	7	-	4	-	11 (7.9%)
Honesty	3	1	1	1	6 (4.3%)
Self-audit	2	2	3	2	9 (6.4%)
Respect	1	1	-	1	3 (2.2%)
Patriotism	5	1	2	-	8 (5.8%)
Total	52	31	32	24	139

When Table 5 is examined, 139 expressions containing value were identified in middle school mathematics textbooks. The textbook with the highest number of these value statements was the fifth grade textbook with 52 value statements. The fifth grade textbook is followed by the seventh grade textbook with 32 value statements and the sixth grade textbook with 31 value statements. The textbook with the least number of value statements is the eighth grade textbook with 24 value statements.

The most common value in middle school mathematics textbooks is the value of love, with 28 (20.1%). This value is followed by responsibility and benevolence with 23 (16.6%) each, friendship with 17 (12.2%), justice and patience with 11 (7.9%) each, self-control with 9 (6.4%), patriotism with 8 (5.8%) and honesty with 6 (4.3%). The least common value is respect, with 3 (2.2%). The results and examples of analysis for each value in the textbooks according to grade levels are given below.

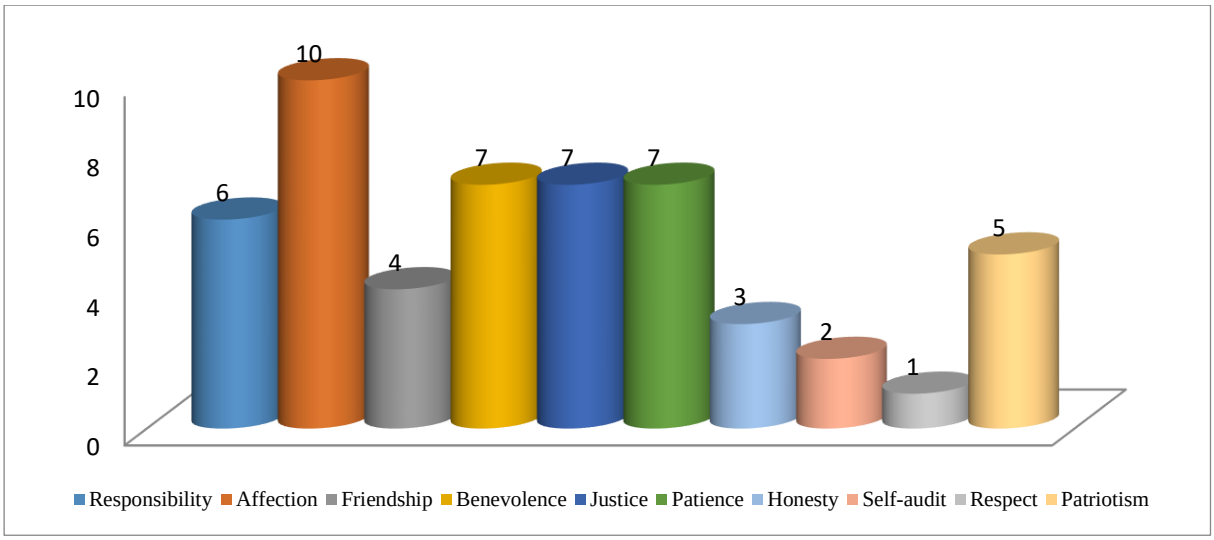


Figure 9 Values in the fifth grade mathematics textbook

According to the frequency graphic of the values in the fifth grade mathematics textbook, the most common value was the value of love with 10 (19.2%). The values of benevolence, justice, and patience follow the value of love with 7 values (13.5%) each; responsibility with 6 values (11.5%), patriotism with 5 values (9.6%), friendship with 4 values (7.7%), honesty with 3 values (5.8%) and self-control with 2 values (3.8%). The least common value was respect with 1 (1.9%). An example of the value of friendship in the fifth grade mathematics textbook is presented below.

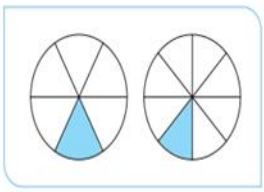
Turkish	English
1. İki arkadaş pastaneye gittiler. Sezgin, 8 eş parçaya bölünmüş pastadan bir dilim yedi. Buse ise aynı büyüklükte ve 6 eş parçaya bölünmüş pastadan bir dilim yedi. İki arkadaştan hangisinin daha çok pasta yediğini bulalım:  Sezgin'in yediği pasta miktarı $\frac{1}{8}$, Buse'nin yediği pasta miktarı $\frac{1}{6}$ kesri ile gösterilir. Modellerdeki parçaların büyüklüklerinden anlaşılacağı gibi Buse, Sezgin'den daha çok pasta yemiştir. Öyleyse $\frac{1}{6} > \frac{1}{8}$'dir.	The two friends went to the bakery. Sezgin ate a slice of the cake cut into 8 equal pieces. Buse ate a slice of the same-sized cake cut into 6 equal pieces. Let's find out which of the two friends ate more cake: Sezgin ate 1/8 of the cake, and Buse ate 1/6 of the cake. As can be seen from the size of the pieces in the models, Buse ate more cake than Sezgin. Therefore 1/6 > 1/8.

Figure 10 Friendship value in the fifth grade mathematics textbook

In Unit 2 of the fifth grade mathematics textbook (p. 74), in the section where sample solutions related to the subjects are explained, two friends going to a bakery exemplify friendship's value.

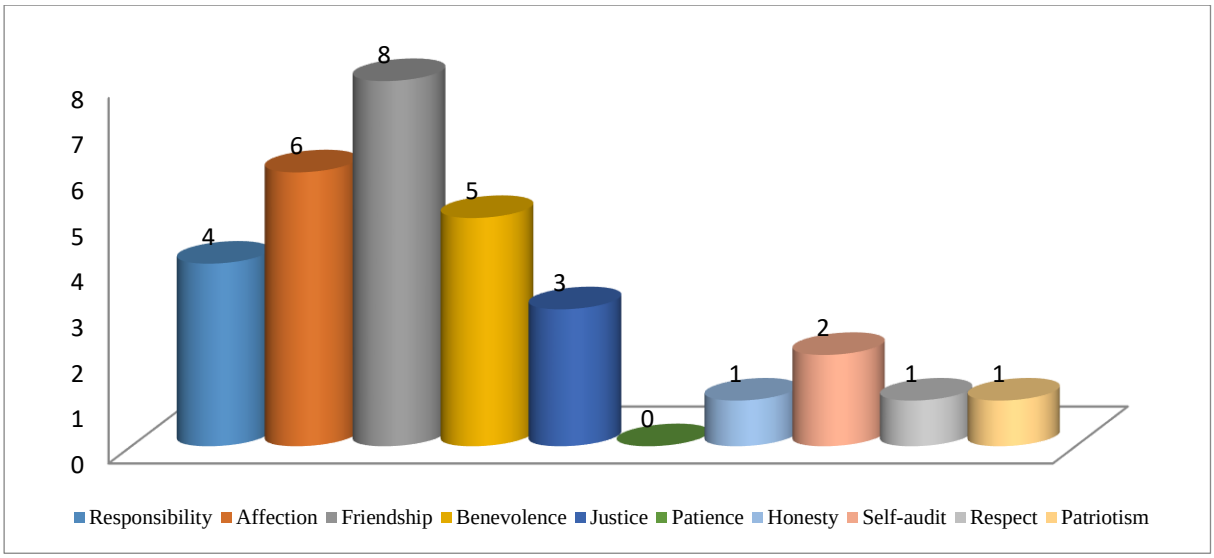


Figure 11 Values in the sixth grade mathematics textbook

According to the frequency graphic of the values in the sixth grade mathematics textbook, the most common value in the textbook was friendship, with 8 (25.8%). Friendship value is followed by love value with 6 (19.4%), benevolence value with 5 (16.1%), responsibility value with 4 (12.9%), justice value with 3 (9.7%) and self-control value with 2 (6.5%). The least common values were honesty, respect, and patriotism, with 1 (3.2%) each. No expression containing the value of patience was found in the textbook. An example of the patriotism value in the sixth grade mathematics textbook is presented below.


Keban Barajı elektrik üretmek ve etrafındaki tarım arazilerini sulamak amacıyla Fırat Nehri üzerine yapılmıştır.

Keban Barajı'nın oluşturduğu göldeki suyun hacmi 31 000 000 000 m^3'tür (otuz bir milyar metreküp).

Keban Barajı'nın oluşturduğu göldeki suyun hacmini ifade eden ölçme birimi hakkındaki düşüncenizi açıklayınız.

Keban Dam was built on the Euphrates River to generate electricity and irrigate the surrounding agricultural lands.

The lake's water volume formed by the Keban Dam is 31,000,000,000 m^3 (thirty-one billion cubic meters).

Explain your opinion about the unit of measurement expressing the volume of water in the lake formed by the Keban Dam.

Turkish English

Figure 12 Patriotism value in the sixth grade mathematics textbook

In Unit 6 (p. 215) of the sixth grade mathematics textbook, in the section with questions associated with photographs to prepare for the subject to be covered, the Keban Dam, which is built to irrigate our country's lands, was constructed to benefit society. The work done to care for society can be an example of patriotism's value.

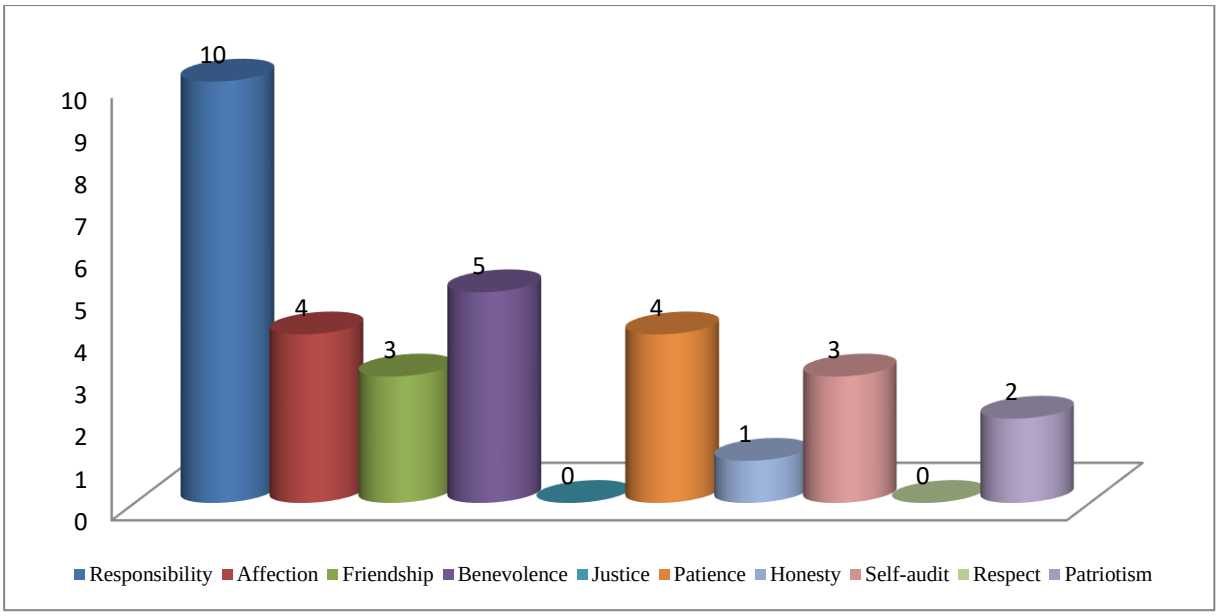


Figure 13 Values in the seventh grade mathematics textbook

According to the frequency graphic of the values in the seventh grade mathematics textbook, the most common value was responsibility, with 10 values (31.2%). Responsibility is followed by helpfulness with 5 (15.6%), love and patience with 4 (12.5%), friendship and self-control with 3 (9.4%), patriotism with 2 (6.3%) and honesty with 1 (3.1%). There are no expressions in the textbook that include the values of justice and respect. An example of the value of honesty in the seventh grade mathematics textbook is presented below.

Bir hayvanat bahçesindeki hayvanların %15'i önceden söz verildiği için başka bir ülkeye gönderilmiştir. Hayvanat bahçesinde 170 hayvan kaldığına göre başka ülkeye gönderilmeden önce kaç hayvan vardı?	15% of the animals in a zoo have been sent to another country because they were promised in advance. Since 170 animals remain in the zoo, how many were there before being sent to another country?
Turkish	English

Figure 14 Honesty value in the seventh grade mathematics textbook

In Unit 4 (p. 135) of the seventh grade mathematics textbook, the zoo authorities' standing behind their promises in the section with practice questions can be given as an example of the value of honesty.

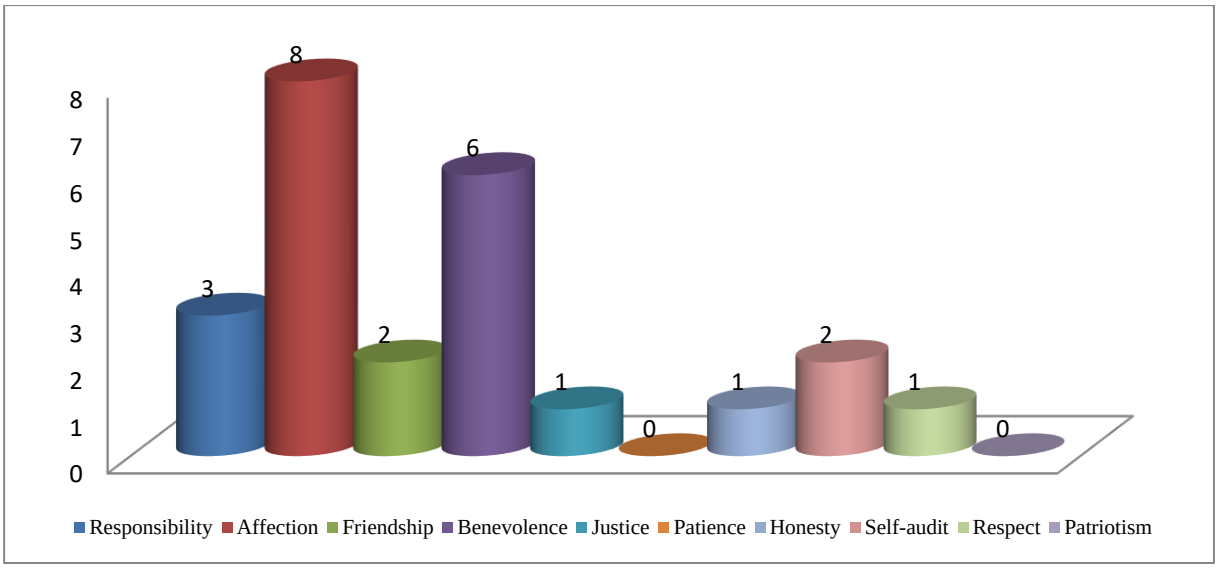


Figure 15 Values in the eighth grade mathematics textbook

According to the frequency graphic of the values in the eighth grade mathematics textbook, the most common value in the textbook was the value of love, with 8 (33.3%). The value of love is followed by the values of benevolence with 6 (25%), responsibility with 3 (12.5%), friendship and self-control with 2 (8.3%) each, and justice, honesty and respect with 1 (4.2%) each. The textbook found no expressions containing the values of patience and patriotism. An example of the value of benevolence in the eighth grade mathematics textbook is presented below.

10. Doktor, Ayşe Nine'ye yazdığı ilaçlardan birini 8 saat, diğerini 12 saat arayla içmesini söyledi. Komşu Suzan Hanım, Ayşe Nine'ye ilaçlarını içeceği saatleri söyleyerek yardımcı olmaktadır. Ayşe Nine, ilaçlarını sabah saat 08.00'de birlikte aldığına göre; **a.** Suzan Hanım, en erken saat kaçta iki ilacını birlikte almasını söyleyecektir? **b.** Ayşe Nine, ikinci kez ilaçları birlikte aldığı zamanda 8 saatte bir aldığı ilaçtan kaç kez almış olur?		The doctor told Grandma Ayşe to take one of the medicines he prescribed 8 hours apart and the other 12 hours apart. Mrs. Suzan, the neighbour, helps Grandma Ayşe by telling her when to take her medicines. Since Grandma Ayşe takes her medicines together at 08.00 in the morning, a. At what time at the earliest will Ms. Suzan tell him to take his two medicines together? b. When Grandma Ayşe takes the medicines together for the second time, how many times does she take the medicine every 8 hours?
Turkish		English

Figure 16 The value of benevolence in the eighth grade mathematics textbook

In the exercises section of Unit 1 (p. 25) of the eighth grade mathematics textbook, neighbour Suzan Hanım is helping Grandma Ayşe take her medicine can be an example of benevolence's value.

Findings related to the fourth sub-problem of the study

In the fourth sub-problem of the study, the findings regarding the distribution of root values in middle school mathematics textbooks according to learning areas are given in Table 6.

Table 6 Distribution of values in middle school mathematics textbooks according to learning areas

Fifth Grade		Sixth Grade		Seventh Grade		Eighth Grade	
Learning Area	f (%)	Learning Area	f (%)	Learning Area	f (%)	Learning Area	f (%)
Numbers and Operations	32 (61.5)	Numbers and Operations	23 (74.2)	Numbers and Operations	13 (40.6)	Numbers and Operations	6 (25)
Algebra	- -	Algebra	0 -	Algebra	11 (34.4)	Algebra	11 (45.8)
Geometry and Measurement	9 (17.3)	Geometry and Measurement	5 (16.1)	Geometry and Measurement	3 (9.4)	Geometry and Measurement	1 (4.2)
Data Processing	11 (21.5)	Data Processing	3 (9.7)	Data Processing	5 (15.6)	Data Processing	2 (8.3)
Probability	- -	Probability	- -	Probability	- -	Probability	4 (16.7)
Total	52	Total	31	Total	32	Total	24

When Table 6 is examined, the fifth grade mathematics textbook values are mostly included in the learning area of numbers and operations with 32 values (61.5%). The numbers and operations learning area is followed by data processing with 11 values (21.5%), and geometry and measurement learning areas with 9 values (17.3%). Since there are no algebra and probability learning areas at the fifth grade level in the curriculum, no values were determined for these learning areas.

The values in the sixth grade mathematics textbook are mostly in the learning area of numbers and operations, with 23 values (74.2%). The learning area of numbers and operations is followed by geometry and measurement with 5 values (16.1%) and data processing with 3 values (9.7%). Since there is no probability learning area at the sixth grade level in the curriculum, no value determination was made for this learning area. In addition, no value statement was found in the algebra learning area at this grade level.

In the seventh grade mathematics textbook the values in the seventh grade mathematics textbook are mostly included in the learning area of numbers and operations with 13 values (40.6%). The learning area of numbers and operations is followed by algebra with 11 values (34.4%), data processing with 5 values (15.6%), and geometry and measurement with 3 values (9.4%). Since there is no probability learning area at the seventh grade level in the curriculum, no value determination was made for this learning area.

The eighth grade mathematics textbook values are mostly in the algebra learning area, with 11 values (45.8%). Algebra is followed by numbers and operations with 6 values (25%), probability with 4 values (16.7%), data processing with 2 values (8.3%), and geometry and measurement with 1 value (4.2%).

Conclusions and Suggestions

This study was conducted to examine the content of primary and secondary school mathematics textbooks in terms of root values and to determine the extent to which root values are included in the textbooks. In mathematics textbooks at the primary school level, the textbook with the highest number of value statements was the first grade textbook. The first grade textbook is followed by the second grade textbook, and then the third grade textbook. The mathematics textbook with the least value statements was the fourth grade textbook. This shows that as the grade level increases in primary school mathematics textbooks, the value expression given in the book decreases. This may be due to the fact that as the grade level increases, the number of objectives to be given in the mathematics curriculum tends to increase or the subjects become more difficult. A similar finding was obtained in another study examining primary y school mathematics textbooks. In their study, Uzunkol and Karaca (2019) found that third grade textbooks included more root values than fourth grade textbooks.

When mathematics textbooks at the secondary school level were analysed in the study, the textbook with the highest number of value statements was the fifth grade textbook. The fifth grade textbook is followed by the seventh grade textbook and then the sixth grade textbook. The textbook with the least value statements was the eighth grade textbook. This shows that the values in middle school textbooks are not organized according to grade level, unlike those in primary school textbooks. This result coincides with the study results (Teker & Ellez, 2022) in which root values in high school mathematics textbooks were examined. In this study, the ratio of root values in high mathematics textbooks to the book's entire content was calculated. The study found that the ratio of root values to content was highest in the tenth grade textbook, followed by the ninth grade textbook. The ninth grade textbook was followed by the eleventh grade textbook, while the twelfth grade textbook had the lowest rate. On the contrary, in another study (Özdemir, 2023) in which secondary school science textbooks were examined, it was found that the fifth grade textbook included the highest number of root values, the eighth grade textbook had the lowest number of root values, and the values included in the textbooks decreased inversely as the grade level increased.

In addition, the most common value in the mathematics textbooks at the primary school level in the study was the value of responsibility. This value is followed by the value of respect and the value of benevolence. The least common value in primary school mathematics textbooks is honesty. Responsibility value is included in textbooks more than other values to increase students' awareness of themselves, their families, and their environment and instil in them that their behaviours can have significant consequences (Özdemir, 2023). Kılcan (2020) examined secondary school mathematics textbooks and found that responsibility was the most common root value. In another study, Akıncı and Yıldız (2023) examined the textual and non-textual elements in four different mathematics textbooks at the secondary school level. They found that the most common value in these books was responsibility. Şahin and Başgül (2018), in their study examining the values in middle school mathematics textbooks, stated that the most common value in these books is responsibility. In another study, Teker and Ellez (2022) concluded that the most common values in high school mathematics textbooks were benevolence, responsibility, and patriotism. In this context, since the value of responsibility is one of the prominent values in these studies, it is similar to the result of our study. In secondary school mathematics textbooks, the most common value is love. The least common value in secondary school mathematics textbooks was found to be the value of respect. This coincides with the results of some studies in the literature. Horzum and Yıldız (2023) examined secondary school mathematics textbooks. While responsibility and love were the most emphasized root values in textbooks at all grade levels, honesty and respect were the least emphasized root values compared to other values. In other studies, overlapping with this result, Uzunkol and Karaca (2019) and Kılcan (2020) stated that the root value of respect was one of the least common values in the textbooks they examined and that these root values were included less than 5% of the time.

When the most common values in mathematics textbooks were analysed according to grade levels, the most common root value in the first grade mathematics textbook was the value of responsibility. In the second grade, the most common root values were love and self-control, and in the third grade, the most common root value was responsibility. The root value most frequently included in the fourth grade textbook was the value of responsibility. This situation reveals that the value of responsibility is emphasized in mathematics textbooks at the primary school level. This result is in line with the results of the studies in which Science textbooks (Yılmaz & Kıran, 2023), Geography textbooks (Aydın, 2019), Physics, Chemistry, and Biology textbooks (Koltaş, 2020), Turkish textbooks (Derse, 2019) were examined. In the

textbooks analysed in these studies, responsibility was the most common value in the textbooks. In mathematics textbooks at the secondary school level, the root value most frequently included in the fifth grade was the value of love. The most common root value in the sixth grade was friendship, while the most common root value in the seventh grade was responsibility. The most common root value in the eighth grade textbook was the value of love. This shows that the most common value in mathematics books at almost all grade levels in primary and secondary schools is love or responsibility. This result is similar to Şahin and Tuğrul's (2020) finding that love is the most common value in primary school textbooks. In studies in the literature (Eken & Öksüz, 2019; Hazım, 2019; Özkan, 2017) in which textbooks in different branches were examined, the value of love is one of the most frequently encountered values. The frequent occurrence of the values of love and responsibility in the analysed textbooks is important in terms of instilling these values in students. Children's awareness of their responsibilities enables them to become individuals who try to fulfil their duties on time and accept the consequences of their behaviours (Yılmaz & Kıran, 2023). Instilling the value of love in children from an early age will enable them to be good individuals towards their environment, friends, nature, and family. Because love is at the beginning of every good deed.

When the least common values in mathematics textbooks were analysed according to grade levels, the least common values in first grade mathematics textbooks were self-control, justice, and love. The expression, including the value of honesty, was not found in the first grade textbook. From this situation, it can be concluded that self-control, justice, and love values were not given enough importance while preparing first grade textbooks, and honesty value was not given any importance at all. The absence of these values in first grade textbooks may pose a problem. Because not including root values in the textbook creates a gap in their teaching (Horzum, & Yıldız, 2023). However, including all root values in the first grade mathematics textbook, which is the first year of primary education, is important for teaching these values and the continuity of this teaching. When the mathematics textbooks at other grade levels were analysed, it was found that the least common values in the second grade were justice and honesty, the least common values in the third grade were honesty and respect. The least common values in the fourth grade were friendship and justice. As can be seen, no attention was paid to a homogeneous distribution of root values in the textbooks. This situation shows that there is no directive or standard for values during the preparation of textbooks (Akıncı & Yıldız, 2023). However, setting a standard and including all root values

in the textbooks in equal or close numbers will prevent a separation between root values and emphasize that all root values are equally important (Özdemir, 2023). In their study, Kuş et al. (2013) also stated that values should be reflected in course materials regularly and consistently.

If we consider mathematics textbooks at the secondary school level, the least common root values in the fifth grade were respect; in the sixth grade, the least common root values were honesty, respect, and patriotism; in the seventh grade, the least common root values were patriotism and honesty; and in the eighth grade, the least common root values were justice, honesty, and respect. This situation reveals that some root values are not sufficiently included in some grade level books and that the contents of the books do not show a homogeneous distribution in terms of root values. In other studies, examining secondary school mathematics textbooks (Horzum, & Yıldız, 2023; Kılcan, 2020), it is stated that the content does not show a homogeneous distribution in terms of values, but the values included in the books are heterogeneously distributed. The situation was similar in a study examining high school mathematics textbooks. Çetin et al. (2021) examined ninth grade mathematics textbooks and found that patience and honesty were less common than other core values. In addition, they stated that this situation posed difficulties in terms of reinforcing values and ensuring continuity.

In addition, in this study, no expressions, including the values of patience in the sixth grade mathematics textbook, justice and respect in the seventh grade mathematics textbook, and patience and patriotism in the eighth grade textbook were found. This shows that the content of these books is lacking in terms of some core values. This may be due to the fact that some values are not given enough importance and are ignored while preparing the books. In another study examining secondary school mathematics textbooks (Horzum & Yıldız, 2023), it was observed that the root value of honesty was not used in seventh grade textbooks, and the value of patience was not used in eighth grade textbooks. This situation reveals that some root values are difficult to teach in mathematics textbooks at the sixth, seventh, and eighth grade levels.

When mathematics textbooks are analysed in terms of learning areas, it is seen that the learning area in which values are most frequently included in the first grade mathematics textbook is numbers and operations. Numbers and operations learning areas are followed by measurement and geometry learning areas, respectively. It is understood that the learning area

with the least number of values in the book is the data processing learning area. It is seen that the values in the second grade mathematics textbook are mostly included in the learning area of numbers and operations. It was found that the learning areas of numbers and operations were followed by measurement and geometry learning areas, respectively. It is understood that the learning area with the least value is the data processing learning area. It is seen that the learning area in which the values in the third grade mathematics textbook are mostly included is the learning area of numbers and operations. While the learning area of measurement followed the learning area of numbers and operations, the learning areas of geometry and data processing were the least covered. It is understood that the section where the values in the fourth grade mathematics textbook are most frequently included is the learning area of numbers and operations. The learning area of measurement followed the learning area of numbers and operations, while geometry and data processing were the learning areas least covered in the book. In this direction, it can be concluded that the learning area in which values are most involved in all grade levels in primary school is the numbers and operations learning area. In contrast, the learning area in which they are least involved is the data processing learning area. This result is similar to the result that the “Numbers and Operations” learning area includes the most social values in elementary school mathematics textbooks (Şahin & Tuğrul, 2020). This may be because the content in the textbooks' numbers and operations learning area contains more examples of daily life situations compared to the content in the data processing learning area.

When mathematics textbooks at the secondary school level are analysed in terms of learning areas, it is seen that the fifth grade textbook contains the highest number of values in the learning area of numbers and operations. While the learning area of numbers and operations is followed by data processing, the learning area with the least number of values is geometry and measurement. In the sixth grade textbook, values are mostly included in the learning area of numbers and operations. The numbers and operations learning area is followed by geometry and measurement and data processing learning areas. It was determined that no value was found in the book in the field of algebra learning. It is seen that the learning area in which the values in the seventh grade textbook take place the most is the learning area of numbers and operations. The learning area of numbers and operations is followed by algebra and data processing. Geometry and measurement were identified as the learning areas with the least values. The eighth grade textbook's section with the highest number of values was determined as the algebra learning area. It was stated that the algebra learning area was

followed by numbers and operations, probability and data processing learning areas, and the learning area with the least value was the geometry and measurement learning area. In this direction, it can be concluded that the fifth, seventh, and eighth grade textbooks overlap with each other in terms of the learning areas with the least number of values, and that the highest number of values in all of these grade levels are in the learning areas of geometry and measurement. In addition, in all of the fifth, sixth, and seventh grade textbooks, the highest number of values is found in the learning area of numbers and operations. This result is the same with the primary school level textbooks. In the eighth grade textbooks, the highest number of value expressions was in the algebra learning area, followed by numbers and operations.

When the distribution of the values in the books within the framework of learning areas is analysed, it is seen that some grade level books show a regular distribution of values. In contrast, some grade level books show an irregular distribution of values. Teker and Ellez (2022) also stated in their study that the tenth grade mathematics textbook was created with a regular distribution in terms of values according to learning areas, but the values in the nineth, eleventh, and twelfth grade textbooks were distributed irregularly. In addition, in another study (Sayın et al., 2019), in which the fifth grade mathematics textbook was examined in terms of values, it was determined that the values in the book were inconsistently distributed. This situation is also supported by many studies that examined textbooks in different branches and reached similar conclusions that the root values included in the curriculum are not reflected in the textbooks in a planned, attentive, and healthy way (Calp, 2006; Ecerkale & Bayrak, 2018; Erbaş, 2021; Güçlü, 2019).

The following recommendations are presented as a result of the results and discussions reached in the study.

- The study's findings show that the root values in mathematics textbooks are not included in equal numbers according to grade levels, and some grade level textbooks include fewer values than others. Based on these findings, it is recommended that mathematics textbooks' content be made more comprehensive in terms of values and that sufficient importance should be given to teaching values in mathematics textbooks at all grade levels.
- The mathematics textbooks examined in this study are the textbooks of some publishing houses distributed by MoNE, and it is recommended that mathematics

textbooks of other publishing houses distributed by MoNE should also be examined from the value context.

- Although there are studies in the literature examining textbooks in some fields in terms of values, examining the content of all textbooks at primary, secondary, and high school levels in terms of values will contribute to the field.

Compliance with Ethical Standards

Disclosure of potential conflicts of interest

No conflict of interest.

Funding

The study was not funded by any organization.

Research involving Human Participants and/or Animals

Ethics committee permission was not obtained since the study was based on document analysis.

İlkokul ve Ortaokul Matematik Ders Kitaplarının Kök Değerler Açısından İncelenmesi

Özet:

Bu çalışma, matematik ders kitaplarının öğretim programında yer alan kök değerler bakımından incelenmesi amacıyla yapılmıştır. Bu amaçla 2022-2023 eğitim-öğretim yılında ilkokul ve ortaokullarda okutulan 8 adet matematik ders kitabı kök değerler bakımından incelenmiştir. Çalışmada nitel araştırma yöntemlerinden doküman analizi yöntemi kullanılmıştır. Belirlenen ders kitapları araştırmacılar tarafından ön okumaya tabi tutulmuş ve değer ifadesi barındırdığı düşünülen ifadeler belirlenmiştir. Çalışmada, ilkokul matematik ders kitaplarında kök değerlerin sayısının sınıf seviyesi yükseldikçe azaldığı görülmüştür. İlkokul ders kitaplarında en fazla sorumluluk değerine, en az dürüstlük değerine yer verilmiştir. Ortaokul matematik ders kitaplarında da kök değerlerin sayısı sınıf seviyesi yükseldikçe (6. Sınıf hariç) azalmaktadır. Ortaokul ders kitaplarında en fazla bulunan değer sorumluluk ve yardımseverlik değerleri iken; en az bulunan değer saygı değeridir. Bu sonuçlara göre ilkokul ve ortaokul matematik ders kitaplarında daha fazla sayıda ve çeşitte değer ifadesine yer verilmesi ve bu değerlerin sınıf seviyelerine ve değerlere göre eşit oranlarda dağılım göstererek ders kitaplarının hazırlanması önerilmektedir.

Anahtar kelimeler: Matematik ders kitabı, ilkokul, ortaokul, kök değerler.

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