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THE EXAMINATION OF THE TURKISH ELEMENTARY FOURTH-GRADE MATHEMATICS TEXTBOOK REGARDING VALUES

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ABSTRACT

This study examines the current Turkish primary school 4th-grade Mathematics textbook through the core values settled in the curriculums to mediate relevant (sub)values by the Turkish Board of Education (BoE). The core and sub-values were investigated through the defined aspects of inclusion, intensity, reflection, and mediation status. This qualitative case-study research was done through document analysis. "Textbook Value Inclusion Form" was developed by the researchers to examine the contents in visual, problem text, and activity sections, and 155 visuals, 117 problems, and 46 activity contents were analyzed. The values were unevenly distributed, where the visuals were more intensive among the content types, while the natural numbers and fractions were more concentrated within the subjects. Consequently, the book mostly covered desired values, but missing and even degenerative contents were also encountered. The values did not reflect a balanced distribution regarding units and core values. The book predominantly reflected the values implicitly. Responsibility, respect, and helpfulness were prominent mediative core values throughout the book, and diligence, healthiness, productivity, collaboration, and tradition were the sub-values being significantly mediated. As a result, the textbook adequately covered particular values, though there were identified areas for improvement, and recommendations were given to address them.

Keywords: *Primary School, Mathematics Curriculum, Values Education, Core Values, Textbook Review*

INTRODUCTION

Children's social, cognitive, and emotional development should progress in parallel throughout primary school, and gaining values is a necessity for the successful socialization of individuals (Abanoz, 2020; Yavuzer, 2009). Values education seeks to create awareness to align individuals' behaviors with specific values (Ginesar & Katilmiş, 2021). According to Goleman (2009), having positive values can lead to academic achievement, social skills, and emotional self-regulation. Conversely, a lack of developing a qualified value system may hinder personal growth and confine the contribution of the individuals to the community (Ekşi, 2003; Sağlam & Genç, 2015). Besides, the Turkish Board of Education (BoE), which is responsible for curriculum development in Turkey, lists gaining the fundamental values as a pivot point among the contemporary developmental needs of the individuals and declares the curriculum renewal studies, settling specific values into the core of the curriculums (BoE, 2017). Accordingly, values of justice, friendship, honesty, self-control, patience, respect, love, responsibility, patriotism, and helpfulness are shown as core values, which were not confined to a particular course but spreading tacitly and wholly to the education process, including every class, activity, tool, and content (Kılıç & Babayiğit, 2017; BoE, 2018). BoE (2017) also suggests two sets of values, core values, and the matching sub-values, to inform how the core values may mediate the sub-values or desirable attitudes and behaviors (Table 1).

Table 1
Core Values and Relevant Sub-Values, Attitudes, and Behaviours

Core Values	Relevant Sub-Values, Attitudes, and Behaviours
Justice	Fair treatment, equality, sharing, …
Friendship	Altruism, trust, understanding, solidarity, loyalty, fidelity, helping, …
Honesty	Transparency, truthness, reliability, keeping promises, …
Self-control	Responsibility, control, self-confidence, apology (when required), …
Patience	Perseverance, enduring, wait, …
Respect	Humility, valuing, treating others as you expect to be treated, taking care of others' personalities/conditions, …
Love	Family, trust, sacrifice, mercifulness, loyalty, …
Responsibility	Consistency, reliability, sense of duty, keeping promises, …
Patriotism	Hard work, solidarity, obeying rules and laws, loyalty, sensitivity to historical and natural heritage, caring for society, …
Helpfulness	Generosity, helping, compassion, hospitality, sharing, …

Table 1 demonstrates that the sub-values, attitudes, and behaviors were not restricted to those presented; using three dots indicates an open-ended coverage of the core values. Textbooks, as a precious transmitter of values, are designed to enhance the incorporation of relevant values accordingly. The effective inclusion of values in textbooks has been an issue for numerous studies, with particular emphasis on social studies, native language, and life science textbooks (Yaman, Taflan & Çolak, 2009; Susar-Kırmızı, 2014; Stockdale, 2015; Yılar, 2016; Güzel-Candan & Ergen, 2014; Kaya, 2019; Kafadar, Öztürk & Katılmış, 2021; Ütkür-Güllühan & Bekiroğlu, 2022; Yinilmez Akagündüz, 2020). However, studies focusing on the inclusion of values in mathematics textbooks are relatively scarce (Sayın, Orbay & Altunay-Şam, 2019; Şahin & Başgül, 2019; Mutlubaş & Şahin, 2022; Uzunkol & Karaca, 2019).

Incorporating values in educational processes is essential; however, compared to other subjects, the presence of values in mathematics teaching literature has been relatively neglected (Bishop, Seah & Chin, 2003). In particular, no study focused on the value phase of Turkish math textbooks before the proclamation of BoE (2017). Within the consequent Maths Curriculum (BoE, 2018) value assignment, math textbooks have undergone revision through the suggested core value set (Table 1). Accordingly, the Primary School 4th-Grade Mathematics textbook was redesigned (Aydın & Erenkuş, 2018) and authorized for use between 2018-2023. However, transforming a mathematics textbook into a vehicle

for value education poses challenges in ensuring the quality of the math content. Therefore, examining math textbooks from a values perspective not only facilitates the integration of values in classroom activities but also contributes to the improvement of future textbooks with value-based content. In this sense, the problem addressed in this study was the examination of the authorized 4th-grade mathematics textbook in terms of values (Aydın & Erenkuş, 2018), which was pursued through the following sub-problems:

1) How is the value inclusion status of the contents?
2) How is the value intensity of the contents?
3) How is the reflection status of the contents?
4) How is the mediation status of the content?

Theoretical Background and Literature

Values education has emerged as a prominent concern in educational policies, with efforts to enhance it encompassing various disciplines. Nevertheless, there is no universally agreed-upon definition of values. The concept of values encompasses multiple interpretations, including long-term beliefs regarding specific patterns of behavior or ultimate goals (Rokeach, 1973), cultural norms dictating what is desirable or undesirable (Williams, 1979), the fundamental drivers or motivations behind attitudes and behaviors (Dönmezer, 1982), and criteria for evaluating what is considered beneficial (Şirin, 1986). These understandings underscore the role of values education in fostering the development of appropriate attitudes and behaviors based on cultural principles.

Concerning students' value achievement, specific value instruction approaches emerged as: (a) "direct instruction of values" as directly and deductively teaching of the values to pupils by teachers or adults, which students are passive in the process (Edwards, 1996; Veugelers & Vedder, 2003); (b) "clarification of values" as not forcing the students to the determined values, but helping them to clarify their own values (Barr, Barth & Shermis, 1977; Edgington, 1981, Milson & Ekşi, 2003); (c) "value analysis" aiming to equip students with research and logical thinking skills to solve value problems (Naylor & Diem, 1987; Sarı, 2007); (d) "holistic approach" to underpin students' finding the proper moral preference through thinking and reasoning skills, where the teachers' judgement is not the main criteria, but one of the varying views (Whitney, 1986); (e) "hidden curriculum", which argues the values cannot be limited into a course (Yüksel, 2004); contrarily, stakeholders should maintain the value education in their interactions (Walkington, 2000).

One of the challenges within these perspectives is determining the equality of all values and, if not, identifying which values should be prioritized. Recently, some schools have treated all values as equal, which poses a problem because every society is built upon specific sequences of values. Therefore, a selective approach is necessary to determine the specific values to emphasize in education. The Character Education Partnership (CEP) has proposed eleven explicit values: caring, honesty, justice, responsibility, respect, civility, cooperation, obedience to authority, nonviolence, abstinence, and a meaningful and challenging academic curriculum. Additionally, twelve implicit values should be implicitly incorporated, including individualism, human dignity, the common good, constitutional rights, citizenship responsibilities, involvement/participation, inclusiveness, diversity, communicativeness, trust, leadership, and appreciation of the community ("CEP-11 principles," 2021).

Turkish BoE (2017) followed a similar strategy, as seen in Table 1. The objective was to divide the large set of values into two main parts making the primary values evident while engaging them with the relevant ones. As a result, the targeted values are simultaneously expected to route to gain the implicit ones (Hoge, 2002). This approach assists practitioners in comprehending which values should be kept focal while others are relevant.

For example, Turnip and Yanto (2021) and Mutlubaş and Şahin (2022) focused on searching for a specific value(s) within the books. On the other hand, Yaman, Taflan and Çolak (2009), Benzer (2013), Stockdale (2015), Yılar (2016), and Şahin and Başgül (2019) explored all the values present in the book contents. Kaya (2019), Kafadar, Öztürk and Katılmış (2021), and Ütkür-Güllühan and Bekiroğlu (2022)

compared the inclusion of values in textbooks from different countries. Besides, Yinilmez Akagündüz (2020) conducted historical research, examining textbooks from a past period concerning values.

Uzunkol and Karaca (2019) conducted a study closely resembling this research in alignment with the BoE's announcement (2017). Their study examined all the values present in the former math textbooks used in the 3rd and 4th grades before implementing the value-based curriculum regulations. However, this current study seeks to extend their work by adopting a multidimensional analytic approach encompassing value inclusion, intensity, reflection, and mediation. Therefore, this research is anticipated to provide valuable insights by exploring math textbooks that have rarely been studied, making a comprehensive and methodical contribution to the field.

METHODOLOGY

Research Design

This research was carried out as a case study, one of the qualitative research methods to examine the values involved in the authorized primary school 4th-grade math textbook. Case studies examine an event, situation, relationship, or process in depth with limited samples (Denscombe, 2010) of individuals, books, curricula, communities, behaviors, or events (Creswell, 2011; Neuman, 2014). The case of this study was the values in the textbook, which was conducted with the document analysis technique.

Document analysis is an organized way of reviewing or evaluating documents (Bowen, 2009), which helps uncover meaning, develop understanding, and realize insights relevant to research problems identified (Prior, 2003). The current 4th-grade Mathematics Textbook was the document examined, and the research method used was particularly textbook analysis.

In textbook analysis, researchers could concentrate on titles such as gender roles or evident aspects of culture(s) (Weninger, 2018). In this study, the values in the textbook were the research focus area, and the book was reviewed through the defined value statuses of inclusion, intensity, reflection, and mediation, as clarified in Table 2.

Table 2
The aim and scope of the value statuses

Value statuses	The aim and scope of the status
Inclusion	to reveal the distribution of proper inclusion of the values, missing and degenerative inclusions.
Intensity	to determine the rates of value inclusion according to subjects and content types.
Reflection	to reveal the core and sub-value distributions through explicit or implicit value settlements.
Mediation	to reveal the links between the core and the sub-values through the examined contents.

These value statuses were examined in the visual, problem text, and activity contents through the sub-problems. The document analysis procedure presented below was applied to answer the sub-problems.

Document Analysis Procedure

The document analysis provides a proper framework showing the data collection and analysis with the validity and reliability issues through the document analysis steps. However, there are a few differences in forming the steps of document analysis; these can be commonly gathered as (a) collecting the proper documents, (b) ensuring the originality of the documents, (c) developing a procedure for coding and theming (d) analyzing the data (Forster, 1994; O'Leary, 2017; Merriam, 2009); so, the document analysis steps in the research were taken through these items.

The steps (a) collecting and (b) ensuring the originality of the document were provided via reaching and matching the hard copies of the textbook with the electronic copy presented (EBA, 2018).

As for the coding procedure in step (c), the researchers developed the Textbook Inclusion of Values Form. While designing this form, Schwartz's (1992) "Value Classification", Rokeach's (1973) "Values List", Demircan's (2010) "Values Review Form", and Balcı's (2014) "Values Concept List" were utilized as sample value lists for value codes. Then, the draft form was created, and then three field expert academicians were consulted, and revisions were made through their feedback. The Textbook Inclusion of Values Form focused on determining the core and sub-values and their presence as explicit or implicit. The form collected data on the visual, problem, and activity contents. The contents were numbered in the textbook's unit order. Then the contents were coded in two consequent steps. First, the content was examined to determine whether it indicates any core and sub-value. The core values were marked on the checkboxes.

Nevertheless, sub-values were an issue of coding. Accordingly, 155 visuals, 120 problem texts, and 44 activity contents were examined, and forty-nine sub-value codes were produced. The decisions for values' properness and explicit or implicit statutes were made by considering whether there is an educational value and whether it is directly showing a specific value or reflected beyond the context tacitly. Mutlubaş and Şahin (2022) provided an example of deciding whether value reflection is explicit or implicit: "A value is explicit, for instance, to discuss global warming graphs with the increasing temperature over the years along with the social responsibilities to deal with (value of responsibility) or when pupils are engaged in solving a problem about fairly sharing the harvested grains among shareholders (value of justice). When the main focus of the question is the calculation of the work hours, presenting an image of equal gender involvement, which is out of the context, equality was evaluated as implicitly reflected". Examples from the textbook in the scope of this study were provided in Tables 5 and 6 to underpin the results with direct quotations (Yıldırım & Şimşek, 2018).

The textbook consisted of six units gathering specific topics presented in Table 3.

Table 3
Sub-value codes produced in the study

Units	Topics
Unit 1	Natural Numbers - Addition and Subtraction of Natural Numbers
Unit 2	Addition and Subtraction of Natural Numbers
Unit 3	Multiplication and Division of Natural Numbers
Unit 4	Fractions - Operations with Fractions - Time Measurement - Data Collection and Evaluation
Unit 5	Geometric Objects and Shapes - Basic Concepts in Geometry - Spatial Relations - Length Measurement
Unit 6	Perimeter Measurement - Area Measurement – Weighing - Liquid Measurement

Regarding coding reliability, two researchers conducted trial coding and then agreed on coding standards. Then, visuals, problems, and activities were coded, respectively. Each coding set was subjected to coding reliability analysis through Krippendorff's (2011) coding-reliability formula (Number of agreed codes/Total number of codes). Codings were consistent with the reliability values of 93% for visual, 93% for problem, and 89% for activity coding. Disagreed codes were discussed and finalized by reaching a consensus.

For the last step (d) of the document analysis, the frequencies and percentages were calculated for the first, second, and third research problems. In the fourth problem, the sub-value codes were linked to

the core values utilizing the relations set in Table 1. The core-sub values were independently linked and subjected to reliability analysis by modifying Krippendorff's formula (2021) as (Number of agreed links/Total number of links), and the reliability value was found to be 85%, which was consistent. The discordant links were discussed and agreed upon. The network analysis and visualization software "Gephi 09.7" was used to visualize the mediation network between the core and sub-values through the frequencies and the links (Figure 1).

FINDINGS

The study results were presented in the order of sub-problem below.

Value Inclusion Status

Value inclusion status was discussed based on the contents' inclusion and non-inclusion of values and inclusion of value degenerations states, and the results are shown in Table 4.

Table 4

Value inclusion status of the examined contents

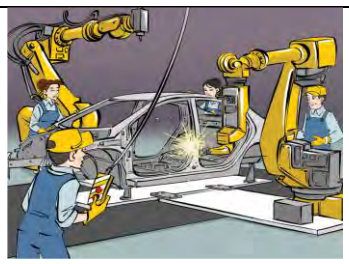
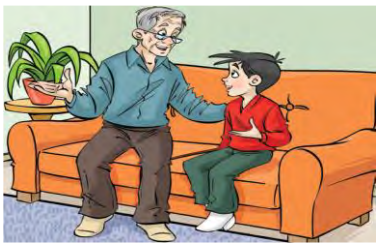
Value Inclusion Status	Visuals		Problems		Activities		Total	
	f	%	f	%	f	%	f	%
Including Values	101	65.1	49	40.8	28	63.6	178	55.8
Not including Values	50	32.3	68	56.7	16	36.4	134	42.0
Including Value Degenerations	4	2.6	3	2.5	0	0.0	7	2.2
Total	155	100	120	100	44	100	319	100

Table 4 shows 101 visuals as 65.1% of the visuals, 49 problem texts as 40.8% of the problem texts, 28 activity contents, 63.6% of the activity contents, and in total, 55.8% of the examined 319 contents were found to contain proper values. The visuals included values the most, followed by activities and problems. On the other hand, 50 visuals at 32.3%, 68 problem texts at 56.7%, and 16 activities at 36.4% were the contents which did not include values. Undesired contents were also encountered, reflecting value degenerations in the visuals and the problem texts with 2.6% and 2.5%, respectively.

When all the examined 319 contents were gathered, it was found that 55.8% included values, 42.0% did not, and 2.2% was degenerative. Content examples about the inclusion status with page numbers in the textbook are presented in Table 5.

Table 5

Content examples of values

Visual Examples		
		
Visual 1 (p.25)	Visual 2 (p.38)	Visual 3 (p.50)
		
Visual 4 (p.139)	Visual 5 (p.139)	Visual 6 (p.228)
Problem Text Examples		
Problem 1. In a fire in a village, seven houses were damaged (...); students collected 2548 Turkish Liras and sent it equally to these seven families. Find out the value each family received. (p.87)		
Problem 2. Büşra bought three T-shirts, each TL 48, for her three children (...) (p.78)		
Problem 3. Mehmet left work at 5 p.m. and informed his wife that he would be home at 7 p.m. Mehmet spent 40 minutes at a bookstore, 55 minutes at a grocery, then got on the bus, which took 25 minutes to reach home. Accordingly, did Mehmet arrive home at the time he promised? (p.138)		
Activity Content Examples		
Activity 1. Steps: 1- Set study groups of four. 2- Each group member should determine a six-digit number. 3- Each group should sort the numbers from major to minor (...) (p.28)		
Activity 2. (...) Please, use the scissors carefully. (...) (p.112)		

The visual examples given in Table 5 are implicit or explicit underlining engaged values through the details, such as an explicit security message in a "summing problem" with a helmet next to the bicycle (visual 1); explicit family, democracy, and participation (visual 2); explicit collaboration, profession, technology (visual 3); explicitly visitation and implicitly tradition via visiting the grandparents (visual 4); implicitly healthiness through the picture of walking at a duration calculation (visual 5); explicit science besides implicit elaboration and security messages through gloves and protector glasses (visual 6), and common smiles in the faces, which indicate kindness and communality as an implicit message.

Problem text examples in Table 5 represent values explicitly sharing, helping, implicitly compassion, and thoughtfulness (problem 1), equality (problem 2), and keeping promises (problem 3); nevertheless, given problems implicitly comprise responsibility, as well. The activity samples reflect collaboration (activity 1) and security explicitly (activity 2) and communality implicitly (activity 1-2).

Examples of the contents without values are presented in Table 6.

Table 6

Content examples without values

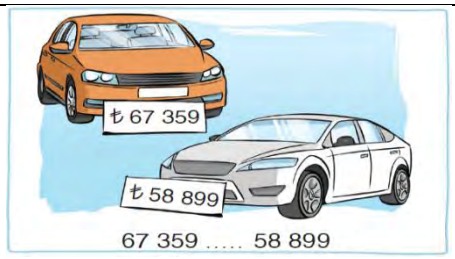
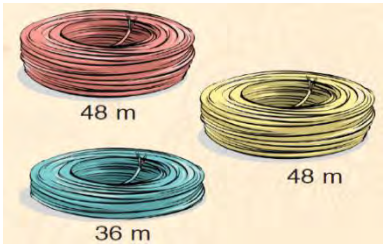
Visual Examples	
	
Visual 7 (p.30)	Visual 8 (p.200)
Problem Text Examples	
Problem 4. Semih went shopping with TL 2000. He bought a shoe for TL 189 and a suit for TL 649 (...). What is the remaining amount of money with Semih after the shopping? (p.64) Problem 5. Funda used 2/9 of her money to buy a bag and 4/9 to buy a shoe. What fraction of her initial amount of money is remaining? (p.161)	
Activity Content Examples	
Activity 1. Steps: 1- Determine two numbers which are three and four digits. 2- Guess the sum of these numbers. (...) 4- Add up these numbers. 5- Compare the result with your guess. (p.50) Activity 2. Steps: 1- Model the equation of 4 x 3=5 +... with counting sticks. 2- Find out how many sticks are needed to provide equality. (...) (p.100)	

Table 6 shows that Visuals 7 and 8 are given to support the relevant questions solely generated to do math operations and do not imply any specific value. Similarly, problems 4 and 5 require students to do the calculations, and activities 1 and 2 involve transaction processes without concern for any value achievement.

Samples of the value degeneration are presented in Table 7.

Table 7

Value-degenerative contents

Examples of Visuals Combined with Exercise and Problem Texts		
		
Visual 11 (p.228)	Visual 12 (p.229)	Visual 13 (p.234)

The contents shown in Table 7 are inconvenient visuals given in the liquid measuring unit of the textbook. Notably, the inclusion of orange juice (visual 11) and ayran (a yogurt and water mixed drink) (visual 12) as healthy beverages contradicts the advice of avoiding packaged nutrition products due to health concerns. Additionally, the presence of a coffee machine (visual 13) raises concerns regarding the compatibility of coffee consumption with the targeted primary school age group.

Value Intensity Status

The value intensity distributions by textbook units are presented in Table 8.

Table 8

Value intensity status of the examined contents

Units	Visuals		Problems		Activities		Total	
	Value / Content	Intense Rate (%)	Value / Content	Intense Rate (%)	Value / Content	Intense Rate (%)	Value / Content	Intense Rate (%)
Unit 1	36 / 14	257	5 / 10	50	9/7	129	50 / 31	161
Unit 2	27 / 18	150	5 / 13	38	1/3	33	33 / 34	97
Unit 3	35 / 28	125	19 / 31	61	6/9	67	60 / 68	88
Unit 4	50 / 43	116	37 / 33	112	5/9	56	92 / 85	108
Unit 5	18 / 20	90	4 / 7	57	3/7	43	25 / 34	74
Unit 6	33 / 32	103	1 / 26	4	7/9	78	41 / 67	61
Total	199 / 155	128	71 / 120	59	31/44	70	301 / 319	94

Considering the intensity rates with the proportion of encountered values to contents examined (Table 8), the visuals were the most inclusive, with 128%, and the activities and problems followed with 70% and 59%, respectively. Regarding the units, Units 1 (161%), 2 (97%), and 3 (88%), with the subjects of natural numbers and the operations (addition, subtraction, multiplication, and division) of natural

numbers and Unit 4 (108%) mostly with fractions and operations with fractions, were the fruitful topics, therewithal geometric shapes, objects, and measurement operations issues of the Units 5 (74%) and 6 (61%) were less.

Value Reflection Status

Value reflection statuses of the contents were handled in two sections as the core values and the sub-values distributions and were presented through Tables 9 and 10, respectively.

Table 9

Value reflection of the core values

Core Values	Visuals		Problems		Activities		Sum		Total
	Explicit (f)	Implicit (f)	Explicit (f)	Implicit (f)	Explicit (f)	Implicit (f)	Explicit (f)	Implicit (f)	
Responsibility	7	10	1	3	-	-	8	13	21
Respect	1	3	1	1	-	4	2	8	10
Helpfulness	3	3	2	-	-	-	5	3	8
Self-control	-	6	-	-	-	-	-	6	6
Justice	-	3	-	3	-	-	-	6	6
Patriotism	-	3	1	2	-	-	1	5	6
Love	1	1	1	1	-	-	2	2	4
Honesty	3	-	1	-	-	-	4	0	4
Friendship	-	3	-	-	-	-	-	3	3
Patience	1	-	-	-	-	-	1	0	1
Sum	16	32	7	10	-	4	23	46	
Total	48		17		4		69		69

Table 9 shows that visuals reflected more core values than the other content types. Responsibility (21), respect (10), and helpfulness (8) were prominent, whereas honesty, friendship, and patience were the lower core values. Among the 48 values in visuals, 32 are implicit, and 16 are explicit. In problem texts, ten values are implicit, and seven are explicit out of 17 indicated values. For activity contents, four were implicit, and none were explicit. Among all 69 core values, 23 were explicit, while 46 were implicit.

Table 10

Value reflection status of the sub-values

Sub-values	Visuals		Problems		Activities		Sum		Total
	Explicit (f)	Implicit (f)	Explicit (f)	Implicit (f)	Explicit (f)	Implicit (f)	Explicit (f)	Implicit (f)	

Healthiness	5	17	-	-	-	3	5	20	25
Collaboration	1	6	-	-	1	14	2	20	22
Diligence	1	16	-	-	-	-	1	16	17
Productivity	-	2	-	15	-	-	0	17	17
Traditionalism	-	10	-	3	-	-	0	13	13
Curiosity	-	-	7	-	5	1	12	1	13
Family	3	6	-	2	-	-	3	8	11
Science	2	6	-	3	-	-	2	9	11
Geniality	-	7	-	-	-	-	0	7	7
Cleanness	-	7	-	-	-	-	0	7	7
Nature	-	4	-	3	-	-	0	7	7
Equality	-	3	1	2	-	-	1	5	6
Fidelity	1	1	3	1	-	-	4	2	6
Communality	-	5	-	-	-	-	0	5	5
Female Workforce	1	3	-	-	-	-	1	3	4
Productivity	1	3	-	-	-	-	1	3	4
Perseverance	-	2	-	2	-	-	0	4	4
Kindness	-	-	2	2	-	-	2	2	4
Altruism	3	-	-	-	-	-	3	0	3
Gifting	1	2	-	-	-	-	1	2	3
Saving	3	-	-	-	-	-	3	0	3
Solidarity	-	2	-	-	-	-	0	2	2
Tidiness	-	2	-	-	-	-	0	2	2
Peacefulness	-	2	-	-	-	-	0	2	2
Art	-	2	-	-	-	-	0	2	2
Appreciation	-	-	-	2	-	-	0	2	2
Profession	-	-	-	2	-	-	0	2	2
Others	4	15	2	5	-	2	6	22	28
Sum	26	123	15	42	6	20	47	185	232
Total for content types	149		57		26		232		

As shown in Table 10, 232 sub-values were identified throughout the textbook. The most common implicit sub-values were healthiness, collaboration, diligence, productivity, and traditionalism, and the most remarkable explicit ones were curiosity, healthiness, and fidelity. The values with only one frequency were gathered under the "others" category. Regarding content types, visuals brought 123 implicit and 26 explicit, problems 42 implicit and 15 explicit, and activities 21 implicit and six explicit, totaling 185 implicit and 47 explicit values.

Core-Sub value mediation status

The core-sub values' mediation status was handled wholly through all the examined contents, and the mediation network was obtained, as shown in Figure 1.

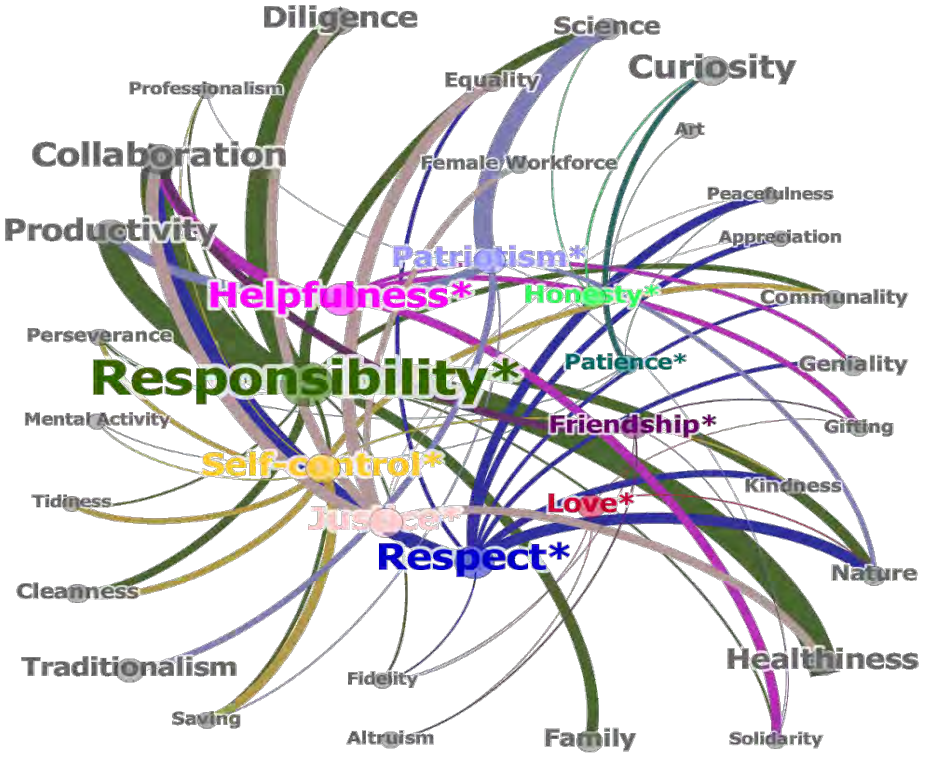


Figure 1. *Core and Sub-Value Network*

Figure 1 contains the ten core values in the network's core, colored and marked with (*). The 27 sub-values were grey and settled after eliminating the values gathered under the "others" category (Table 8). The value node sizes differed according to the frequency of the values. The core value node's color was maintained through link paths to clarify the core values' mediation towards sub-values. Thicker links indicate stronger mediation from the core values to the sub-values.

Relations were unevenly distributed, showing the need to improve the contents to strengthen the thinner links between core and sub-values, such as love*-gifting, patience*-art, and patience*-perseverance. The more apparent core values of responsibility, respect, patriotism, justice, helpfulness, and self-control mediated most sub-values with bolder links. However, the remainder core values of honesty, friendship, love, and patience were weak.

DISCUSSION

The results achieved by examining the visual, problem, and activity contents of the 4th-Grade Mathematics Textbook were discussed in this section in the "value status" order. The inclusion status revealed that 55.8% of the contents included values, and 42% did not, whereas 2.2% of the contents were regarded as degenerative. For instance, the shopping problems given in Table 5 depend merely on personal spending; however, these problems may include values through issuing donations, scholarships, buying gifts, and helping the family budget. Plenty of studies asserted that textbooks did not portray well-balanced distribution of the values, implying the missed opportunities of value-laden contents (Aslan, Coşkun-Keskin & Önder, 2019; Coşkun & Çiftçi, 2019; Şahin & Başgül, 2019, Sayın et al., 2019; Acar & Yaman-Kasap, 2020, Mutlubaş & Şahin, 2022). In particular, from a before and after perspective, Uzunkol and Karaca (2019) assorted 13 different values examining the former 4th-grade math textbook written before the curriculum value-focused renewal, and only 1,8% of the book contents were related to values. In contrast, the current 4th-grade math textbook reviewed in this study found

covering 62 values with a 55,8% inclusion rate with a dramatic increase showing the robust effect of the BoE's (2018) curriculum value regulations. In general, several studies found and accepted the boost in the values within mentioned regulations commendable but reported varying missed values and proposed better distributions.

One of the most critical findings of this study was the encountered degenerative contents. Despite being at a low percentage of 2,2%, it is still a crucial threat to education. Since packaged products are a matter of unhealthy nutrition, packaged drink visuals can be inferred as an overlooked misuse while intending to foster healthy drinks. Also, the coffee visual was improper for the primary school age. Tokmak and Aktaş (2022) examined the opinions of the 5th-grade students towards social studies textbook value targeting images and reported that nearly a quarter of the students' views were negative. For instance, an image depicting a child working to highlight the importance of labor was deemed a violation of child rights, as children under eighteen should not engage in labor activities. These examples show that misunderstandings may occur within the preferred items of an image, which may be perceived as far from the intended value messages. The contents should not display undesired stuff; therefore, a multidimensional and attentive control procedure is needed while designing the contents. In this regard, alternative contents may be submitted to the samples of students and teachers to avoid misperceptions.

The values were searched in visuals, problem texts, and activity contents of the textbook, and visuals were the most intensive content type with a 128% value reflection rate, where activities were 70% and problems 59%. The visuals were used efficiently in including values, but the problem texts were insufficient. Likewise, Hatay Uçar and Çetinkaya (2021) found that problems were the weakest elements regarding value inclusion in their study of the life-sciences textbooks. Öztürk and Özkan (2018) examined a 3rd-grade life sciences textbook and observed that visuals contained values more than twice as often as texts. Visuals were found to be more effective in reflecting values. However, there is room for improvement in embedding values in problems and activities. Marinković and Eric (2014) argue that verbal contexts do not efficiently develop values since they are not a dogma in that these activities may play a critical role at this point. Hence, value-based math activities should be held more prominent to provide values within experiential contexts.

The value intensity status assorted natural numbers and four operations on natural numbers, fractions and fraction operations as the most fruitful value-reflecting subjects. Şahin and Başgül (2019) also found that the numbers and operations in the 8th-grade math textbook were the most value-containing units. Contrarily, in our study, geometric objects and shapes and measurement topics were revealed with poor value-embedded contents, showing a need to improve these topics in value terms (Table 5). Also, Daher (2021) directly focused on the Geometry and Measurement unit of the 6th-grade Palestinian math book regarding the value categories and found that social values were relatively low. Compared to algebraic problems, geometry and measurement may be harder to produce value-embedded contents, but enriching the less value-inclusive topics and qualifying the non-including value contents may improve the value distribution. The beginning of geometry mostly stemmed from regulating human lives against the natural threads, likewise other science fields. One important example in Ancient Egypt's history is the problem of measuring the areas to redetermine the fields' boundaries after the river Nile overflows (Sertöz, 2008). Thus, the first steps in geometry and measurement are taken to protect property rights. Thus, geometry and measurement contents can be designed to keep human rights as mentioned, which could tacitly empower social value awareness.

Value reflection status was discussed through core and sub-values, respectively, and in both titles, implicit reflections highly surpassed explicit ones. In core values, implicit reflections were twice the explicit ones; also, in sub-values, implicit ones were nearly four times the explicit ones (Tables 7 and 8). Likewise, Hatay-Uçar & Çetinkaya (2021) examined the core values reflections in the Social Life Sciences textbook as direct-indirect in the same manner and detected 399 direct and 774 indirect mentions of values. In their fifth-grade math textbook review, Mutlubaş & Şahin (2022) reported that the values mainly were implicitly presented. Accordingly, values were embedded in the textbook's

contents mostly in a tacit manner in line with the BoE's (2017) advice of which values should be implicitly reflected in education.

The most encountered core values in the textbook were responsibility, respect, helpfulness, self-control, and justice. Similarly, In Sayın et al.'s (2019) review of a former 5th-grade math textbook, self-control, helpfulness, justice, and responsibility were identified as the prominent values. On the other hand, Mutlubaş & Şahin's (2022) review of a renewed 5th-grade math textbook reported patriotism, responsibility, and self-control as evident values. Şahin & Başgül (2019) found that responsibility, love, and helpfulness most coincided in the middle school grades math textbooks review. Acar & Yaman-Kasap (2020) studied the high school Biology textbook and observed that helpfulness, responsibility, and patriotism were prominent, and the core values were not adequately nor proportionally distributed at grade, subject, and unit levels, and some of the core values were totally neglected in each book. Similar results within varying studies show gaps between the curriculums' expectation of conveying the values in the textbooks and its reflections on the books. When designing coursebooks, it is significant to align with the curriculum in terms of content and learning outcomes. This means considering not only cognitive development but also the overall philosophy of the curriculum during the textbook writing process.

When the core value mediation status was considered, responsibility, respect, helpfulness, patriotism, self-control, and justice knitted more intense nets with the sub-values. However, the rest of the core values, namely love, honesty, patience, and friendship, were comparably rare (Figure 1). Similarly, Mutlubaş and Şahin (2022) found patriotism, self-control, and responsibility highly mentioned, whereas friendship and honesty were low. The presence of the core values, like being divided into two sets as intense and rare mediation sources, implies the inner relationships of the emerged sets. Through the intense set, it is possible to evaluate responsibility with self-control, patriotism (Ketenci, 1997), and justice with responsibility as close value-hoods, bringing overlaps in the intense part of the network. When a sub-value is related to a core value, it is likely linked to the neighbor values. In the latter set of core values, which were weakly related to sub-values, love is close to friendship (Schwartz, 2012) and patience, and therefore, the opposing alliance may have caused rare parts in the network.

CONCLUSION

Examining the 4th-grade math textbook in Turkey regarding values, offers valuable insights for educators, curriculum developers, and policymakers around the world. The study provides a framework on how textbooks may better incorporate educational values, which can be adapted to various cultural and educational settings, ensuring that values are embedded in a meaningful and well-engaged manner. Additionally, the research emphasizes the need for a balanced approach to value integration, allowing for maximum incorporation without compromising core educational content. This balance is essential for educators globally, promoting a holistic approach to education that fosters cognitive, moral, and social development in students.

The study was conducted to determine the values in the 4th-grade math textbook within the frame of inclusion, intensity, reflection, and mediation statuses, and the following conclusions were made: (a) the textbook was sufficient to reflect values implicitly as required by the renewal of curriculum; (b) values mainly were educational, but also few degenerative contents were encountered, showing the importance of value-based control of the books, (c) visuals led the value inclusion, and problem texts were proportionally the lowest; (d) a significant difference was observed between specific topics' value intensity; (e) the core values of responsibility, respect helpfulness, honesty, and self-control were the most mediating while healthiness, diligence, productivity, collaboration, and curiosity were the most coincided sub-values. Several criteria were inferred in the study, which may help international textbook developers seeking a more qualified value-centric approach:

* Values should mostly be embedded implicitly in harmony with the nature of the course.

* A value-content economy should be considered by conveying as many values as possible in each content. For instance, a shopping problem can be created with the parts of buying a gift for "helpfulness," buying domestic goods for "patriotism," and buying the goods to share equally, such as parents buying clothing for each child for "justice."

* Value settlement should present a balance regarding considered value statuses.

* The contents should be questioned regarding missing values that should be integrated.

* The contents should be attentively controlled against undesired or degenerative elements.

Limitations and Future Research

The results of the study bring new scopes for future research. This study and several relevant research reported that the values were not well-balanced proportionally in the textbooks. Accordingly, new studies can be conducted on the teachers' awareness of the neglected values and how they may compensate for them. Future studies could also focus on the preference of the textbook author's awareness and their tendencies to affect the values' distributions in the textbook. Degenerative contents are another thread encountered in this study. Research focusing on detecting the contents, which may be harmful in a set of a specific field's textbooks, may shed light on the new textbooks' content development process in the same field. Geometry and measurement units were in a shortage of values in the study. These specific topics can be examined through plenty of countries' textbooks regarding values, and hence different ideas for integrating the values in such units can be gathered. Another important result was that the values were more implicitly reflected. The implicit reflections may stand flue from students' perspectives. Thus, they can be checked through the students' comments. Finally, particular core values produced an intense network with the related sub-values, whereas some of them were rare. Research to cope with the difficulties of engaging the specific core values within a particular subject's condition may be fruitful. For instance, searching how the value of "love" can be attached to the mathematical contents may contribute to book writers as well as teachers.

The study also had several limitations, which may provide new paths for future studies. This study was conducted through the researchers' coding; therefore, it depends on their understanding; however, teachers' and students' comprehensions are also crucial because they are first-hand practitioners of the textbooks. Their feedback would contribute to capturing a collective sense of value settlement. Moreover, teachers and/or students may attend to develop new value-laden content through action research, which may provide a rich set of ideas. Nevertheless, this study depended on the core values of the BoE. However, field-based new core value sets could be developed in the context of the course.

Through the growing importance of value education, any turning points like settling the core values into the focus of the curriculums by BoE (2017) give new directions to the researchers and practitioners. Meanwhile, research based on the renewal with a chronological perspective could also provide beneficial orientations.

Ethics and Conflict of Interest

A part of this study was presented as an oral presentation at the Congress of Dicle University International Interdisciplinary Symposium, 17-18th November, 2022, Diyarbakır, Turkey. We also declare that there is no conflict between the authors.

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