Examination of Mathematics Concepts in the Third Grade Life Sciences Textbook According to Mathematics Acquirements from the 3rd Grade to the 8th Grade

Perihan Şara Hürsoy*   Doğan Yalçın**

Abstract

The aim of the research is to determine the mathematical concepts in the third-grade life science textbook and to examine the relationship between these concepts and the mathematics achievements of the students from the third grade to the eighth grade. Document analysis technique, one of the qualitative research methods, was used in the research. As a document, the Pacific Publishing 3rd grade Life science textbook provided to public schools by the Ministry of National Education in 2021 was examined. In data analysis, descriptive and content analysis techniques were used according to the nature of the sub-purposes. In the study, as a result of examining the life science lesson in terms of mathematical concepts, "locating and drawing", "data analysis", "time calculations" and "basic mathematics knowledge" were determined as the themes. Categories related to these themes and related mathematical concepts forming the categories were determined in terms of unit and topic distribution. Four categories were determined in the research. These are "Direction and sketch drawing", "table and graphic interpretation", "time units" and "mathematical literacy and four operations". When the units are evaluated together, it has been determined that there are 19 concepts related to mathematics in the third-grade life science textbook. It has been observed that "data analysis" has been found to be the theme most strongly linked to mathematics achievement, and it persists as a spiral of maths success across all grade levels.

Keywords: Third grade life science textbook, math concept, math achievement, relationship between math and life science lessons.

* (iD) Corresponding Author, Assist. Prof., Uşak University, Türkiye, perihan.sara@usak.edu.tr

** (iD) Phd Student, Ministry of National Education, Türkiye

*** This study is an extended version of the paper presented at the III. Turkish Education Congress held on December 23-24, 2022.

Introduction

Life science can be defined as a lesson with a content aiming at helping students acquire the characteristics of intended feature of today's people and current needs at an early age. According to Tay and Yıldırım (2013), the child's spirit is taken into consideration in life science lessons and it is tried to facilitate the child's adaptation to the society she lives in. According to Bektaş (2007), on the other hand, it provides the opportunity to carry out the real-life information that children learn in the family in a formal way through schools.

Life science lesson is applied at the first, second and third grade level in primary school (MONE, 2018a). The general objectives, learning areas and achievements related to the content of the course in the life science lesson are specified in the curriculum. Life science curricula are used to prepare the child for life, reintegrate child in society and to transfer an instructive content to daily life. According to Gültekin (2015), thanks to the life science curriculum, students can learn their duties and responsibilities towards themselves, their family, environment and the state, and thus they can both improve themselves and contribute more to the society.

One of the basic disciplines that the life science lesson includes mathematics. Mathematics is a discipline that requires logical thinking, based on counting, calculating and measuring in order to solve the problems of the human mind in daily life (Altun, 2013). When the mathematics lesson is considered historically, it can be said that it is not static, it is lively and system-based, and it progresses cumulatively (Furinghetti, 2000). Comprehension of mathematical subjects can be possible with the acquisition of basic mathematical skills (Kammenui & Simons, 1999). Today, features, such as problem solving, high-level thinking, and transforming mathematical knowledge are the types of skills that are considered important in terms of mathematics lessons. An individual who can solve problems can solve many problems functionally in daily life and owes this ability to the effective use of mathematics. Therefore, being able to meet skills, such as, mathematical thinking, being mathematically literate, and problem solving at an early age facilitates students' adaptation to daily life and develops students. According to Demirel (2009), in ensuring this development, programs for teaching experiences have an important place in the activities carried out in schools. Textbooks are also used to convey the general framework drawn by the curriculum. By preparing the textbooks in accordance with the program, the general philosophy of the program and the achievements, it is possible to ensure the integrity of the program-content in a functional way. This is valid for the life science lessons as well as for all other lessons. In addition, if the preparation of the books for the next grade level is good, students can transfer their knowledge to the next level more easily. According to Aktepe, Cepheci, Irmak and Palaz (2017), concept teaching and methods are frequently used today in order to place and transfer the knowledge to the mind of the student in the classroom learning-teaching process. Because concepts have crucial place in shaping knowledge. According to Tural (2011), the ability of a student to learn a concept related to a

subject or phenomenon can help him catch the focus of that subject, support teaching help realization of permanent learning.

Today, the list of concepts is not given in advance in the textbooks, and the concepts can be reached by analyzing the content of the book. In this study, since the determination of the mathematical concepts in the third-grade life science textbook and their association with the mathematics achievements from the third to the eighth grades were examined, dealing with not only the life science concepts but also the mathematics lessons and its achievements in detail was found to be convenient.

Purpose of Study

In the study, the mathematical concepts implicitly given in the third-grade life science textbook were determined and the relationships that could be established with the achievements in the mathematics curriculum at the third to eighth grade levels were examined. Thus, it was aimed to present an interdisciplinary study that combines life science lessons, which provide the child's adaptation to school and society according to current needs, and mathematic lessons, which develop skills such as calculation, problem solving and functional thinking in daily life, in terms of concepts and achievements. Based on this aim, answers to the following questions were sought:

- What are the mathematical concepts in the life science textbook?

- In which unit and subject are the mathematical concepts included in the life science textbook?

- How can the mathematical concepts in the life science textbook be classified?

- In which achievements in the mathematics curriculum have the mathematical concepts in the life science textbook been identified?

- How do the mathematical concepts in the life science textbook show continuity in the achievements in the mathematics curriculum?

Importance

Concept teaching has been very important for all courses in recent years and it is one of the methods that can be used differently in each course in accordance with the constructivist philosophy (Tural, 2011). According to Erdoğan & Erdoğan (2009); the teaching of concepts is encountered in different acquisitions in curricula from pre-school to the last periods of primary school. Many different methods can be followed in teaching concepts. Concept-oriented teaching is frequently used today to develop high-level skills and the student's ability to know and use the concept well accelerates the knowledge construction process (Erikson & Lanning, 2014; Fannin, 2017). Therefore, it is a necessity to define, understand and know the concepts in the teaching process well.

Life science lesson is an important lesson that guides children who try to adapt to daily life in primary school. Therefore, it contributes to the development of cognitive and affective skills together with many practical information that children use in daily life (Özden, 2005; Ütkür-Güllühan & Bekiroğlu, 2022). Therefore, the taught concepts in this course play a role in children's ability to transfer knowledge to daily life and to grow up as individuals meeting the requirements of 21st century skills. Also mathematics is one of the most effective disciplines that helps to improve the way of thinking. According to Yıldızlar (1999), an individual who can realize mathematical thinking can approach the problems she encounters in life from a different perspective and can solve these problems without any difficulty. One of the main purposes of the life science program is to provide students with real life skills (MONE, 2018). Realistic mathematics education also relates mathematics to daily life through scenarios. In this way, students can be enabled to transfer knowledge based on real-life problems in mathematics education (Gravemeijer, 1994; Zulkardi, 2002). Mathematical theories that have been kept up-to-date today, such as realistic mathematics education developed in the 1970s under the leadership of Dutch mathematician Hans Freudenthal, have an important place at this point (Witmann, 2005). According to Çilingir (2015), with realistic mathematics education theory, students can solve problems related to daily life because they feel the need to solve that question, and they can find the problem interesting. While solving the problem, they can make sense of the answer to the question "What good would that do?" thanks to realistic mathematics education theory. Freudenthal (1991) and Van den Heuvel-Panhuizen (2003), on the other hand, expects mathematics to be directly related to reality, to have humanitarian values and to be appropriate for the structure of society. When viewed from this aspect, it is seen how realistic mathematics education theory can be intertwined with the life science lessons that meets the needs of society and people. Therefore, theories such as realistic mathematics education, which seem to be specific to the mathematics lesson, are actually suitable for interdisciplinary and coordinated teaching in the life science lesson and can provide a productive learning environment for the student.

This research tried to determine the concepts related to mathematics in the third-grade life science textbook and their associations with the achievements in the mathematics curriculum since the list of concepts is not given in advance as in previous years. Being able to learn the concepts of two different fields (life science and mathematics) examined in the study at an early age allows students to use their minds in a versatile way. Therefore, this study can contribute directly or indirectly to many studies in terms of addressing these two different fields in a holistic way in primary and middle schools and determine the relationship between the mathematical concepts in the third-grade life science textbook (from 3rd to 8th grades) with mathematics achievements. Identifying and using them in daily life the mathematical concepts and achievements that can be associated with the Life Science lesson, which aims to provide students with basic life skills, can help classroom teachers create meaningful learning environments. At the same time, students may need to learn mathematics with real-life problems.

Students who can grasp mathematical concepts at a young age, based on the life science lesson, can also exhibit positive attitudes towards mathematics in the following levels of education. If students who need to learn mathematics develop positive attitudes towards the lesson, it will also positively affect mathematics teachers. For all these reasons, the study is considered to be important. Another importance of the study is that when the literature is examined, there are not many studies in which life science and mathematics lessons are synthesized together (Kara, 2021; Baş, Işık-Tertemiz & Tay, 2021). So this study can contribute to the field in this respect too.

Method

In this part of the study, information about the research model, data collection tool and data analysis process will be shared. Since the research is a document review study, it was not considered within the scope of studies requiring ethics committee approval.

Model of the Research

In the research, the findings were obtained through document analysis technique, which is one of the qualitative research methods. The document analysis technique can be used to examine the educational fields, program instructions, internal and external correspondence in schools, meeting records, teacher and student textbooks and plans. Purpose of document review is to analyze written materials containing information about events and facts. In the descriptive analysis technique, a summarized version of the data is presented to reader. In content analysis, following the examinations similar concepts are transformed into themes and conveyed to the reader through themes (Yıldırım & Şimşek, 2008). The reason for using document analysis in this study is due to the fact that the third-grade life science textbook was examined in terms of various variables.

Data Collection Tool

Life science lesson is taught in the first, second and third grades of primary school. More mathematical concepts are used at the third-grade level than at other grade levels. For this reason, in the research, Pacific Publishing third grade life science textbook, which is the textbook provided by the Ministry of National Education in 2021, was examined as a document. This book, written by Ataşçi (2018), was accepted as a textbook for 5 years starting from the 2018-2019 academic year, with the decision of the Board of Education and Discipline of the Ministry of National Education, dated 28.05.2018 and numbered 78. As the other document, the learning outcomes in the Mathematics Course Curriculum of the MONE (2018b), with which the mathematical concepts identified in the life science textbook were associated, were used. The reason for examining the Mathematics Curriculum from Grade 3 to Grade 8 in the study is to reveal the continuity and integrity of the basic mathematical concepts that children have learned in the life science course.

Data Analysis Process

All pages of the book, which was assigned as a third-grade life science textbook in 2021, were examined. As a result of the examinations, concepts related to mathematics were determined by the consensus of field experts and researchers. One of these researchers is a field expert who has been working in the Department of Elementary Education for 11 years. The other researcher is a science expert who has been working as an Elementary Math teacher in the Ministry of National Education for 12 years. In cases where the two researchers could not reach a consensus, a common decision was reached by taking the opinion of a classroom teacher with a professional seniority of more than 20 years. While determining the concepts, answers were sought for questions such as: "In which unit, in which topic title, what is the page number, what is the usage area?" The obtained variables were tried to be expressed in a holistic way through Table 1.

In addition, while applying document analysis, descriptive analysis or content analysis techniques suitable for the type of sub-purposes were used.

By using the descriptive analysis technique, mathematical concepts in the 3rd grade Life science textbook was examined in terms of the unit and the subject, and the continuity of the achievements in the mathematics curriculum at the 3rd to 8th grade levels.

Content analysis technique was used in the analysis of sub-purposes, such as what the mathematical concepts in the third grade Life science textbook are, how they are classified and how they can be related in terms of the achievements in the mathematics curriculum at the third to eighth grade levels. The mathematical concepts obtained as a result of the content analysis were grouped using code headings. Then, categories (usage areas) and themes (most general titles) were obtained to reflect the general name of the codes. Finally, for the study four themes were determined based on the results of study.

The mathematical concepts obtained following the document review in the research are "right"- "left"-"front"-"back", and grouped as the first code related to "sketch drawing". As the second code, the concepts of "table"-"graph" and "plan" were determined. For the third code, the concepts of "day", "month", "year", and "hour" were determined. As the last code, the basic four operations skills and general mathematical concepts related to mathematical literacy were determined. To this section, basic concepts (codes) such as "number", "division", "surplus", "budget", "attitude", "investment", "conscious consumption" were included. The theme of this section was stated as "basic mathematics".

In the next stage of the study, categories and themes were created with the help of codes. It was determined that the mathematical concepts determined separately for all four themes can be associated with which mathematics achievements in the current curriculum for grade levels from third to eighth grade. The findings obtained as a

result of the research were expressed with 2-stage tables. At which grade level the achievements take place and continuity were other topics examined in the study.

Findings

The findings obtained in the study are presented below in accordance with the sub-purposes with the help of tables in two stages.

Mathematical concepts in the life science textbook, units and subjects of concepts and classification of these concepts:

In the research, firstly, the mathematical concepts in the Life Science textbook, the units and subjects of the concepts and the classification of the concepts into codes and categories were made. Later, the classifications were associated with mathematics achievements. The first stage of the findings of the study is expressed in Table 1:

Table 1.

Mathematical concepts, related sub-purposes and categories in the third-grade life science textbook

Unit no.	Unit	Subject Title	Page no:	Detected Mathematical Concepts- Codes	Usage Area-Categories
1	Life in Our School	I Draw a Sketch of My School and Class	20 and 22	Right, Left, Front, Back (East, West, North, South).	Direction and sketch drawing 1
2	Life in Our Home	I Know the Address of My House and I Draw a Sketch	53	Right, Left, Front, Back (E, W, N, S).	Direction and sketch drawing 1
2	Life in Our Home	Spending Table and Chart	64	Table and Graph	Table and Graph interpretation 2
2	Life in Our Home	I am a planned person.	66	Plan Hour	Time units 3
2	Life in Our Home	Event-Time Table	68	Table Plan Hour	Table and Graph interpretation 2
2	Life in Our Home	Want or Need?	69	Budget Conscious consumption	Mathematics Literacy and Four Operations 4 Mathematics Literacy and Four Operations 4
3	Healthy Life	I Eat a Balanced Diet-Turkish People Are Getting Obese	85	Excess (sorting)	Mathematics Literacy and Four Operations 4

3	Healthy Life	Specific Days and Weeks - Attitude, Investment and Turkish goods week	93	Attitude-investment	Mathematics Literacy and Four Operations 4
4	Safe Life	I take precautions against accidents	105	Day, month, year Expiration date	Time units 3
4	Safe Life	I Know What To Do In An Emergency	109	Numbers 112 Emergency number	Mathematics Literacy and Four Operations 4
5	Life in Our Country	I Do My Duties For My Country	132	Dividing	Mathematics Literacy and Four Operations 4

When the units are evaluated together, it has been determined that there are 19 concepts related to mathematics in the third-grade life science textbook. In the unit "Life in Our School", the concepts of "right"-"left"-"front"-"back" and "drawing a sketch" were included in the topic titled "I Draw a Sketch of My School and Classroom". The same concepts took place again in a spiral manner in the "Life in Our Home" as the sub-topic of the topic "I Know the Address of My Home, I Draw a Sketch" The identified concepts of "right" - "left" - "front" - "back" and "sketch" were determined as codes and stated as the theme of "locating and drawing".

In the "Life in Our House" unit, it is seen that the table and graphic concepts (codes) are included in the "Expenditure Statement and Graph" topic. In the same unit, as an activity, the "Plan" code was determined for the purpose of creating a planned table within the title of "Timetable". The second theme, which includes a total of three concepts, was named "Data Analysis". In the "Life in Our Home" unit, there are also the concepts of "plan" and "clock" within the title of "I am a planned person". In this section, one of the codes (concepts) determined in the "Time calculations" theme is the "clock" code. On the other hand, in "Wants or Needs?" unit, the concepts of "budget" and "conscious consumption" were determined. These codes are also an element of the fourth theme, "Basic Mathematics Knowledge".

The "Excess (Sorting)" code (concept) in the "I Eat a Balanced Diet-Turkish People Are Getting Obese" topic in the "Healthy Life" unit, which is the third unit, is also included in the "Basic Mathematics" section, which is the fourth theme. In the "Specific Days and Weeks" section of the same unit, the concepts of "attitude" and "investment" under the heading "Attitude, Investment and Turkish goods week" were similarly added to the fourth theme.

The use of the concepts (codes) of "day", "month", "year" while examining the expire dates of products in the "I Take Precautions Against Accidents" topic in the fourth unit "Safe Life" is also a component of the "Time Calculations" chapter in the third unit. Calling 112 under the heading "I Know What to Do in an Emergency" in the same unit

is also incorporated in the fourth theme, "Basic Mathematics", within the scope of recognizing numbers.

In the fifth unit, "Life in Our Country", students are expected to benefit from the basic division process in order to work in groups of three people under the title of "I Do My Duties for My Country". The "division" code created in this way was added to the fourth theme, "Basic Mathematics" section. As a result, the codes, themes and classification of themes (in terms of unit and topic) were determined by following the fore mentioned steps and methods.

The steps followed in the second stage and the findings obtained are shared.

### Identification of Themes and Association of Concepts with Mathematics Achievements:

The codes, categories and themes created according to the mathematical concepts in the third-grade life science textbook given as a whole in Table 1 are discussed. Mathematical concepts are grouped under four themes. A detailed examination of associating the grouped themes with the achievements in the mathematics curriculum from the third to the eighth grade is made in this section.

First theme: Locating and drawing:

The information created for the concepts of "right"-"left"-"front"-"back" and "sketch" is presented in Image 1, and related achievements associated with mathematics are presented in Table 2.

Image 1.

Locating and drawing (First theme)
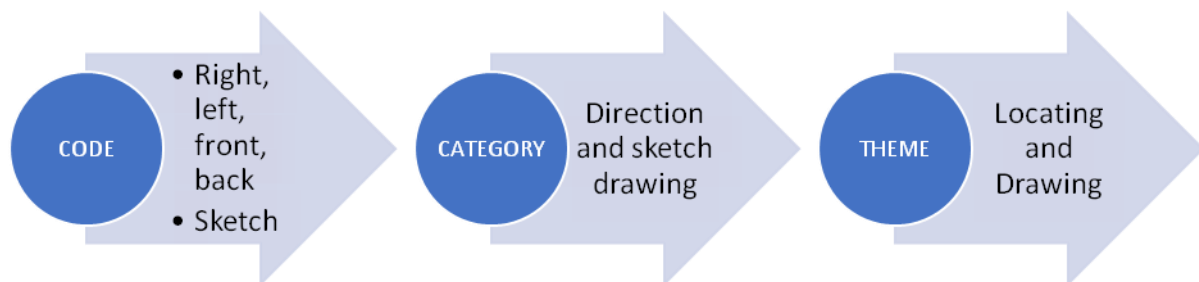
It is a mathematical association that is directly related to the subject of describing the place-direction in the fifth grade "M.5.2.1.2. It expresses the position of a point relative to another point using direction and units (MONE, 2018b) and the reflection-translation in the 8th grade. The mathematical achievements of the concepts in the subject of ground-orientation drawing are clearly used in the fifth and eighth grades.

Table 2.

Mathematics achievements examined according to different grade levels in the mathematics curriculum for the first theme
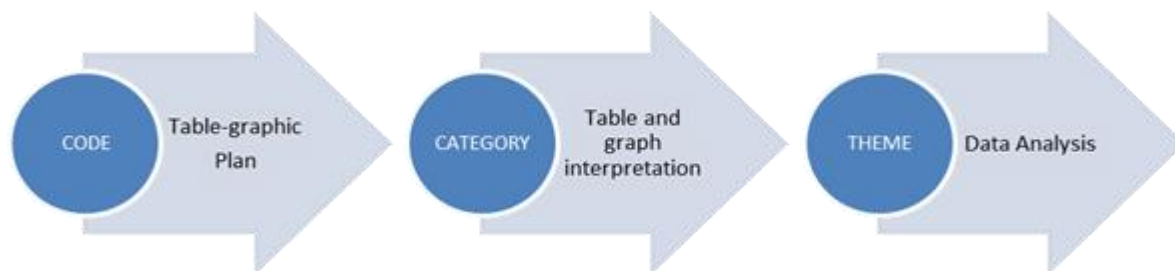
Grade Level	Mathematical achievements related to concepts (MONE, 2018b)
3	*"M.3.2.1.3. Draws square, rectangle and triangle using ruler; determines the diagonals of square and rectangle."* *"M.3.3.2. Measurement the Environment"* *"M.3.3.3. Area Measurement Gain group"*- sketch
4	*"M.4.3.2. Measurement the Environment"* *M.4.3.3. Field Measurement"*-sketch (In some types of questions related to environment and field measurement,house plans can be given in the form of sketches and various calculations can be made.)
5	Location – directions description: *"M.5.2.1.2. Expresses the position of a point relative to another point using direction and units.* *a) Checkered, dotted paper, etc. work is done on it. For example, point A is 3 units to the right/left of point B; 2 units below/above; Like 2 units up/down 4 units right/left* *b) Examples of real-life situations are also included."* Sketch: *"M.5.2.3.2. Calculates the perimeters of triangles and quadrilaterals, creates different shapes with a given perimeter. Studies on estimating the perimeter length are included."* *"M.5.2.4. Field Measurement"* acquisition group
6	*"M.6.3.2. Field Measurement"* acquisition group-sketch (In some types of questions related to field measurement, house plans can be given in the form of sketches and various calculations can be made.)
7	*"M.7.3.2.5. Solves field-related problems."*–sketch (In some types of questions related to field measurement, house plans can be given in the form of sketches and various calculations can be made.)
8	Location-direction: *"M.8.3.2.1. Draws the images of the point, line segment, and other shapes as a result of the translation.* *c) In the translation, it is noticed that every point on the figure moves in the same direction and that the figure and its image are equal.* *"M.8.3.2.2. Creates a reflection image of a point, line segment, and other shape."* *"M.8.3.2.3. It creates the image of polygons resulting from translations and reflections.* *a) A maximum of two consecutive translations or reflections are allowed."*

Second Theme: Data Analysis:

The theme related to the concepts of "table - graphics" and "plan" is given in Image 2, and the mathematical achievements related to the theme are given in Table 3.

Image 2.

Data analysis (Second theme)

Plan code can be used in terms of creating tables and planning skills.

Table 3.

Mathematics outcomes examined according to different grade levels in the mathematics curriculum for the second theme

Grade Level	Mathematical achievements related to concepts (MONE, 2018b)
3	*"M.3.4.1.1. Explains the information shown in the figure and object graphics, makes conversions from the graph to the scoreboard and frequency table and interprets it. They are asked to comment on the whole data by comparing different parts of the data."* *"M.3.4.1.2. Solves problems that require addition and subtraction by using the information given in the graphs or by creating graphs."* *"M.3.4.1.3. It reads and interprets simple tables of up to three data groups and organizes the data obtained from the table.*
4	*"M.4.4.1.1. Examines the column chart, makes comments and predictions on the chart."* *"M.4.4.1.2. Creates the column chart. Before the bar chart is created, the data is organized with the help of an object or shape chart. Scoreboards and frequency tables can also be used. In the first studies, checkered paper and colored unit squares can be used.."* *"M.4.4.1.3. Uses different notations to present its data.* *a) Different representations such as horizontal or vertical column chart, figure chart, object chart, table, tree diagram are used.* *h) By making use of different representations of the data, a relationship is established between savings awareness and financial literacy."* *"M.4.4.1.4. Solve daily life problems using information represented by bar charts, tables, and other graphs."*
5	*"M.5.3.1.2. Collects data on research questions and displays it with a frequency table and column chart."* *"M.5.3.1.3. Solves problems for interpreting data represented by frequency tables and bar graphs. (Column charts that lead to misinterpretations are also examined)."*
6	*"M.6.4.1.1. It generates research questions that require comparing two sets of data and obtains appropriate data."* *"M.6.4.1.2. It shows the data of the two groups with a binary frequency table and a column*

|	
	chart."
	"M.6.4.2.3. It uses arithmetic mean and span to compare and interpret data belonging to two groups. Studies to interpret arithmetic mean and span in real life situations are included.
	"M.7.4.1.1. Creates and interprets line charts for data.
	a) Graphic creation studies belonging to two data groups are also included.
7	*b) Line charts that lead to misinterpretations are also examined.*"
	"M.7.4.1.3. Creates and interprets the circle chart for a data group. When creating a circle graph, interactive information and communication technologies are used when necessary."
	"M.7.4.1.4. It displays the data as a column, circle, or line graph and makes the appropriate conversions between these representations."
	"M.8.4.1.1. Interprets line and column charts of up to three data groups."
	"M.8.4.1.2. It displays the data as a column, circle, or line graph and makes the appropriate conversions between these representations."
8	*"The strengths and weaknesses of different representations relative to each other are emphasized.*"
	"M.8.2.2.3. Expresses how one of the two variables that have a linear relationship between them changes depending on the other, with a table and an equation.
	a) In the representations made with tables, expressions in the form of ordered pairs are also included."
	"M.8.2.2.4. Draws graphs of linear equations."
	"M.8.2.2.5. Creates and interprets equations, tables and graphs of real-life situations with linear relationships."
	"M.8.2.2.6. Explains the slope of a line with models relates linear equations and graphs to slope."

Among the mathematical concepts in the third-grade life science textbook, the theme most related to the mathematics lesson is the title of "tables and graphs". Tables and graphics are included with different achievements for each grade level in and after the 3rd grade. Although the content and level of the gains vary, there is certain spirality between the gains.

The second mathematical association of this section, "the ability to create a table by scheduling", is important in terms of creating and reading the table. Tables and graphs are tools that support each other in conveying and presenting data. These two skill types are discussed together in the section (page 64) where tables and graphs are examined in the third-grade life science textbook. Therefore, in the study, it was deemed suitable to create a theme by combining the concepts of tables and graphics, and to progress in a holistic manner in the examination of mathematics teaching programs at the levels from third to eighth grade.

Third theme: Time calculations: The theme formed by the codes "day", "month", "year"and "hour" is presented in Image 3, the section on mathematics achievements is presented in Table 4:

Image 3.

Time calculations (Third theme)

CODE: Month, Year, Hour

CATEGORY: time units

THEME: Time calculations
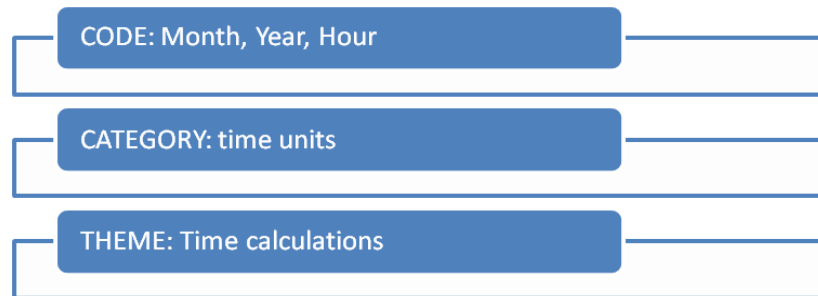
According to the data in Table 4, knowing that the day is 24 hours (dividing the day into hours and arranging what to do by dividing it into hours), students can visualize the concept of time in their minds and plan it by calculating a certain period of time. This situation is directly related to daily life. This subject, which is covered in the Life Science lesson, is included in the mathematics curriculum at the same grade level, *"M.3.3.5.1. Says, reads and writes time in minutes and hours.", "M.3.3.5.2. Explains the relationship between time measurement units"* and *"M.3.3.5.3. It compares the occurrence times of the events (MONE, 2018b)"* supports the achievements in a holistic way.

Table 4.

Mathematics achievements examined according to different grade levels in the mathematics curriculum for the third theme

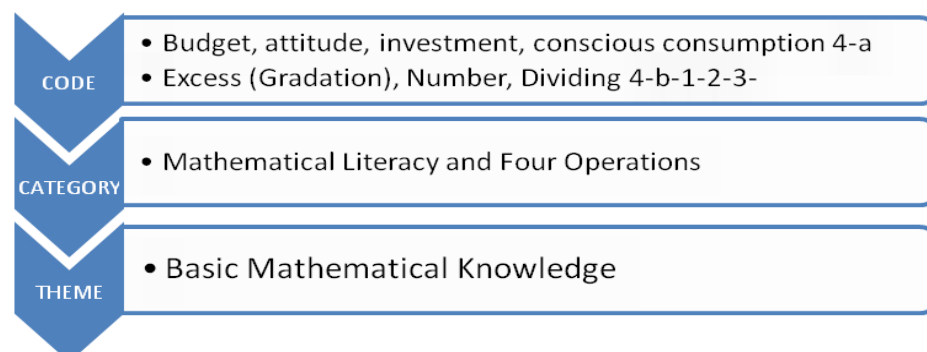| Grade Level	Mathematical achievements related to concepts (MONE, 2018b)
	"M.3.3.5.1. Tells, reads and writes time in minutes and hours."
	"M.3.3.5.2. Explains the relationship between time measurement units.
	a) Explains the relationship between year-week, year-day, minute-second."
3	*"M.3.3.5.3. Compares the occurrence times of events.*
	a) The measurement and comparison of the tasks, the time between the start and the end of a particular job or action is made.
	b) Examples where different time-measuring instruments such as hourglasses are used are also included.
	"M.3.3.5.4. Solves problems in which time measuring units are used."
	"M.4.3.4.1. Explains the relationship between time measurement units.
	a) Conversions between hour-minute, minute-second are made.
	b) Conversions between year-month-week, month-week-day are made.

4	*c) Leap year is also mentioned while making the conversion."*
	"M.4.3.4.2. Solves the problems in which time measurement units are used.
	a) Emphasis is placed on the importance of time management in problems. Problem posing studies are also included."
5	*"M.5.2.3.3. Recognizes time measurement units, converts them to each other and solves related problems.*
	a) Seconds, minutes, hours, days, weeks, months and years are considered.
	b) Problems related to time management are addressed."
6	-
7	-
8	-

In addition, it can be said that the readiness for the following achievements in the 4th grade mathematics curriculum has been achieved thanks to the subject of examining the expiration date of the products taught in the third-grade life science lesson: *"M.4.3.4.1. Explains the relationship between time measurement units."* and *"M.4.3.4.2. Solves the problems in which time measurement units are used (MONE, 2018b)."* The ability to accurately read the expiry date of a product as day/month/year and interpret it according to the present is related to the concepts in the "Time calculations" theme. These concepts are also within the scope of a basic mathematical literacy skill. Time calculations and concepts are available in the mathematics curriculum up to the fifth grade; they do not show continuity for the next grade levels.

Fourth Theme: Basic Mathematic Knowledge: In this section, the general concepts related to mathematics are determined in two sections. All identified concepts and outcome associations are presented in Image 4 and Tables 5 and 6.

Image 4.

Basic mathematic knowledge (Fourth theme)

CODE
- Budget, attitude, investment, conscious consumption 4-a
- Excess (Gradation), Number, Dividing 4-b-1-2-3-

CATEGORY
- Mathematical Literacy and Four Operations

THEME
- Basic Mathematical Knowledge

In this section, the codes consist of two parts. The code group, expressed as 4-a, includes attitude, investment, conscious consumption and budget. As the 4-b code, associations based on excess (gradation, few-many, quantity and logical reasoning), overarching based on numbers and division are called 4b-1, 4b-2, 4b-3, respectively.

A- For the code of "budget- attitude- investment, conscious consumption": Four concepts related to mathematics and associations with the achievements in the mathematics curriculum were determined. The mathematical concepts and their associations with the achievements are analyzed in Table 5.

The acquisitions directly related to the concepts of "savings" and "attitude" were determined at the 3rd and 4th grade levels in the mathematics curriculum. In addition, the emphasis on frugality is also present in the program. Also questions about the concepts of "budget- attitude"-investment - conscious consumption" can be asked to students about percentages at the seventh grade level as an indirect association. Therefore, these concepts can also be indirectly associated with the subject of percentages. The concepts in this section do not have continuity for the current achievements in the mathematics curriculum from the third to the eighth grade.

Table 5.

Examination of the mathematical concepts of attitude, investment, conscious consumption and budget calculations of the theme 4-a in terms of the achievements in the mathematics curriculum

Grade Level	Mathematical achievements related to concepts (MONE, 2018b)
3	*"M.3.3.4.1. Shows the relationship between the Turkish lira and the penny.* *a) For example, 325 pennies is expressed as 3 liras and 25 pennies.* *"M.3.3.4.2. It solves problems with our coins.* *a) Emphasis is placed on the importance of saving in problems." -attitude* *"M.3.4.1.1. Explains the information shown in the figure and object graphics, makes conversions from the graph to the scoreboard and frequency table and interprets it. They are asked to comment on the whole data by comparing different parts of the data. For example, when the graph showing the number of breads sold in a week in a grocery store is examined, it is noticed that the number of bread sold on the weekend is higher than the number of bread sold on the other days."*
4	*"M.4.4.1.3. It uses different notations to present the data it obtains.* *h) By making use of different representations of the data, a relationship is established between savings awareness and financial literacy."*
5	*"M.5.3.1.1. Creates research questions that require data collection.* *b) Environmental awareness, frugality, cooperation, avoidance of waste, etc. topics are covered when creating the research questions.*
6	-

| 7 | M.7.1.5. *For attitude, investment, conscious consumption questions with various scenarios in the percentages achievement group.* |
| 8 | - |

B- For the code of "excess", "number", "division": Three concepts related to mathematics and associations with the achievements in the mathematics curriculum were determined. The mathematical concepts and their associations with the achievements are presented in Table 6.

In order for students to comprehend the b-1, b-2 and b-3 outcomes, their basic mathematical knowledge or mathematical literacy should be at a sufficient level at each grade level. B-1 acquisition is based on few-many-(quantity-logical) reasoning skills; B-2 gain is based on the ability to recognize numbers and to be mathematically literate at a basic level in daily life; the achievement for B-3 is also based on the basic operation skill of dividing a number (whatever it is) by 3 in order to be able to group by three.

Table 6.

An investigation of 4-b theme of mathematical concepts regarding few-many, (quantity and logical) reasoning, and mathematical literacy at the basic level in terms of acquisitions in the mathematics curriculum

Grade Level	Mathematical achievements related to concepts
3	*"Compares up to five natural numbers less than 1000 and ranks them using symbols"*. -Few-many quantity, b-1
4	-
5	-
6	*"M.6.4.2.1. Calculates and interprets the range of a data set."* Smallest- Largest value, quantity, b-1
7	-
8	-

The mathematical gains related to b-1 from the associations are given in Table-6. In addition, although it is not directly associated with mathematical achievement, the situation determined for the issue of calling 112 in emergency situations where numbers are used in daily life was evaluated within the scope of mathematical literacy (4-b-2). In the lesson, which was taught by a group work, the ability to be a group of three - division, division, and grouping by counting in threes rhythmically was also evaluated as mathematical literacy - ability to perform operations (4-b-3).

Results, Discussion and Recommendations

In this section, the conclusion, discussion and suggestions are shared according to the order of the sub-purposes.

For the First, Second, and Third Sub-Purposes:

In the study, the results about the mathematical concepts in the third-grade life science textbook, in which unit and subject distribution these concepts are included, and which themes can be classified are as follows:

The importance of the theme of "Locating and drawing" in terms of life science and mathematics; is helping students find their home, school or a point as a reference. Because students can make sense of directions with these concepts and visualize the location of an address in their minds. As a result, this situation can help the development of students' visual spatial and map reading skills. According to Taş (2008), asking geographical questions such as "what, where, why is it there?" contributes to the development of observations, perceptions and location determination in students. Also, according to the results obtained in Kuzey's (2016) study, students were found to be successful in "determining location and coordinates", "finding and describing directions". Students' success in this subject improves their directional literacy. The number of geolocation achievements can be increased in order to improve directional literacy in the life science lesson. Thanks to directional literacy, students' knowledge of location finding and directions can be transferred to daily life more easily. From this point of view, it can be interpreted that the role it plays in ensuring the transfer of up-to-date information learned in the school environment to daily life for the life science lesson has been realized in accordance with its purpose.

Another code in the first theme is the concept of sketch. The ability to understand and draw the sketch can be associated with the environment-area questions in the mathematics lesson. A limited number of studies have been found in the literature regarding sketching skills. In Kuzey's (2016) study, it was concluded that students were unsuccessful in drawing sketches. Based on this result, it may be difficult for students to understand the perimeter-area questions asked based on the sketch in the mathematics lesson in the future, and this may reduce the success rate in tests or exams.

In order to prevent this situation as much as possible, the sketch subject can be associated with mathematics more and the sketch questions can be made more concrete for students with the life science lesson. Therefore, this skill should be taught to students at an early age in the life science lesson by taking precautions to better understand the sketch subject, and then it should be supported more with mathematic lessons. In this way, students' success in mathematics can also increase in the future. Carrying out the sketch drawing skill in the life science lesson with reflective thinking activities or worksheets included in the mathematics curriculum (which allows

associating it with the environment-field topics) can increase the quality of the teaching of both courses.

When the importance of the concepts in the "Life in Our House" unit is examined in terms of social studies and mathematics lessons, it is seen that charts and graphics exist in all areas of life (teaching activities, economy, medicine...). Therefore, it can be predicted that the acquisition of skills such as reading, understanding and interpreting charts and graphs in the life science lesson will positively affect the students' further education life. This contribution, which starts with the life science lesson and continues with mathematics, covers not only teaching activities but also daily life skills.

The concept of "plan", on the other hand, regulates what, how and in what time period students can do from their lesson work to their daily work. In fact, students who can grasp the efficiency of studying at an early age with a good planning strategy actually lay the foundations of reflective, critical thinking and meta-cognition. Because the student who can learn to work with a planned strategy is aware of what subject she understands or does not understand, she can determine what she has learned, how much she has learned, the missing points in the learning process or which subject she needs to work more on. This may contribute to the development of meta-cognition. For this reason, the fact that the concept of "plan" is well absorbed by the student is a supportive factor that develops high-level thinking skills beyond being a contribution of the life science lesson to that student. The concept of "time", on the other hand, implicitly supports the "plan"b ecause plans can be created by calculating time and taking time as a reference. In addition, the skills of converting time measures into each other in the concept of time are directly related to mathematics. The concepts of "budget" and "conscious consumption" identified in this unit will be concepts that students will encounter again at different grade levels in mathematics lessons. The concept of "budget" enables adults to calculate their income-expenditure. Similarly, with the concept of "conscious consumption", children realize that they cannot buy something they need or everything they want. With this aspect, life science lesson prepares children for life. Basic concepts such as "making a budget", "saving", "conscious consumption", "looking at the expiration date of products" are concepts that are not forgotten once learned and experienced. This shows the functionality, currency and permanence of the basic concepts learned in the life science lesson.

Students who can grasp the "excess" code, among the concepts in the "Healthy Life" unit, can improve their skills of few-many-quantity-reasoning. The development of quantity and reasoning skills can also benefit the student in a variety of situations, from shopping in daily life to animating what is told in an abstract text. Starting from the pre-school period, students may encounter the concepts of "less-more". However, even if the student still cannot visualize these concepts in his mind, this situation can be compensated in primary school through life science and mathematics lessons. The concepts of "attitude" and "investment" are similar to the concepts of "savings" and "conscious consumption", and they are concepts that the student can always use once they learn without forgetting them.

For the themes in the "Safe Life" unit, students' knowing, understanding and associating time calculations with daily life takes place under the guidance of the life science lesson. Afterwards, the context of the subject continues in relation to the mathematics lesson in terms of converting and calculating time measures, and it shows continuity. Likewise, the ability of a primary school student to be mathematically literate to call 112 is an ability to keep up with the times, and thanks to the life science lesson, the student learns to adapt to the age. A student who understands this subject can save the life of a relative who was injured in a traffic accident or poisoned due to expired food by calling 112. Therefore, the subject of "I Know What to Do in an Emergency" is a topical issue that seems simple but is of vital importance.

The concept of "division" identified in the unit "Life in Our Country" shows that it is a necessity to be able to do basic math calculations even in a simple instruction directed to students in daily life.

Except for the sixth unit, it is seen that there is a mathematical concept in every unit. Mathematical concept continuity can be provided for Unit 6. Considering the nature of the life science lesson and its relation with other lessons, it is seen that the number of mathematical concepts identified is low. The number of concepts associated with mathematics, and hence the number of mathematical achievements, can be increased because life science and mathematics lessons can be intertwined in many subjects in daily life. The fact that the subjects and activities in the textbook reflect mathematical concepts can increase the situations in which students benefit from mathematics in their daily lives. Thus, topics and activities can be handled more efficiently in an interdisciplinary way. Students' experience of transferring knowledge can increase and the situation of associating two courses with each other can become more concrete for students. This situation can increase students' ability to establish interdisciplinary relationships and improve their ability to acquire 21st century basic life skills and high-level thinking skills.

For the Fourth Sub-Purpose: Themes and Outcome Associations:

No study has been found in the literature that deals with life science and mathematics lessons in an interdisciplinary manner in a detailed and holistic manner. However, some studies have been found on associating the subjects in social science and mathematics lessons. Aybek (2001) has a study that found that class teachers for 4th graders associate social studies-mathematics at the "occasionally" level. Besides, Şahinkaya and Aladağ (2009) have a study in which they examine the association of social science-mathematics lessons for fourth-seventh grades. In this study, it was concluded that the number of achievements associated with mathematics decreased as the grade level increased in the social science curriculum, and it was stated that the association with the mathematics lesson was not sufficient. According to Yıldız (2019), mathematics lesson and social science teaching are in the nature of making associations, and the author also has written a book chapter which examines the relationship between social science and mathematics lessons in detail. In this study,

subjects related to social studies and mathematics lessons were grouped into 5 groups. Three of these 5 groups were created specifically for certain subjects. The first of these subjects has been comprehensively determined as "the ability to use maps, scales, tables, graphs, diagrams, figures or spheres". When the relationship between these topics in terms of life science and mathematics achievements is compared, it is seen that the scope of the subject in social science-mathematics lessons is wider. The primary cause of this might be because secondary school students are generally older and more mentally mature. On the other hand, these topics, which Yıldız (2019) dealt with by combining, were separated in this study. Due to the content of the life science lesson, it is seen that there are more basic concepts such as location-direction, position determination, and sketch drawing, which are not directly related to the map and scale subjects but are preparatory to these subjects. Assuming that the subjects of location, direction, and location determination are acquired by the students, it can be interpreted that they lead to the learning of map and scale skills in the social science lesson in the future. Additionally, in this study, the table-graphic theme was kept separately. The subject of tables and graphics were associated with mathematics by showing continuity towards the content of the life science and social studies lesson both in primary school and in secondary school. This situation points to the conclusion that table-graphs have a very important place in teaching activities. It is a common point in both studies that table-graphic skills take place at an important level and that they should be studied more as literature.

In Yıldız's (2019) study, while the subjects of time and chronology skills were discussed more broadly, in this study, time calculations and time measurements in life science and mathematics lessons were examined in terms of converting them to each other. This shows that the two studies examined the same theme from different aspects. In addition, in the same study, while creating a topic for social science as "position and coordinate skills", the theme of "locating and drawing" was created in this study. In the study, these two themes are similar in general terms. The part where the two studies differ is that after the "point, location" skill, Yıldız (2019) associated with the "coordinate system" due to the content of the social science lesson (in the middle school mathematics part), while in this study, "drawing" was used due to the content of the life science lesson (due to the concept of sketch) is that it is associated with the skill of continuing.

In the study, the associations of the mathematical concepts in the third-grade life science textbook with the achievements in the mathematics curriculum (three-eighth grades) are presented in Tables 2.3.4.5 and 6 above. In this section, how the related themes and topics can support each other is discussed under separate sub-headings.

First theme: Regarding the theme of locating and drawing:

The concepts of "locating" and "drawing" can be associated with mathematics. Because the terms used by students while determining location and direction will help to explain the position of one point relative to another or to carry points in the coordinate system

in translation-reflection issues in the next grade levels. Also, the functional acquisition of the geolocation part can increase students' preparation for map teaching and scale in the social science lesson, which is the next teaching step. This result is supported by the result that Sönmez (2010) obtained in study that with the increase in the mathematics achievement scores of the students, their mapping skill levels also increase. In addition, with the increase in mathematics skills, it will be easier to comprehend the subjects directly related to life science such as "determining location and coordinates" and "finding the direction", which are other points that the two studies support each other. There are a limited number of "Location-direction and position determination" studies in the literature. In this regard, studies can be conducted to examine the effect of early directional literacy on visual-spatial intelligence. In addition, activities that can provide transportation from one point to another, such as location-direction determination, location and address description can be carried out with various approaches (game-activity-based…).

Sketch drawings can also be included in the questions of perimeter-field calculations in the geometry learning field. In the questions in which various parts of a house, room or garden are shown in the form of sketches, skills related to the ability to calculate perimeter-field are measured. Students who are familiar with the sketch at an early age can visually internalize these questions more easily and feel more comfortable at the point of solution. Because it can be seen that students approach some questions in a biased way, where visual tools are intense or there are long question tables (Kablan & Bozkuş, 2021). This may trigger negative affective features defined as math anxiety and fear.

Second theme: Data analysis:

Tables and graphs are used to impart and resent information in many different fields. Today, because information is rapidly increasing, it is critical to be able to show the information in terms of time efficiency in reading, understanding, and presenting. Tables and graphs are a common subject in many courses, as curricula are prepared by considering these current needs in education. When this situation is examined for the social studies and mathematics lesson, it can be said that the studies on table graphics are relatively more than the studies on other themes. Pala and Başıbüyük (2019) stated in their research that students' mathematical skills explain their ability to read maps by 39%, read graphics by 43%, and read tables by 40%. Also, in the same study, 54% of reading skills for these 3 subjects (map, table, and graph) can be explained holistically with mathematics skills in the social science lesson. From this point of view, it is probable that a significant improvement in mathematics skills will be achieved in the secondary school section with the good understanding of the data analysis theme obtained in this study by the students in primary school. Because "table and graph" codes are constantly included in the secondary school mathematics curriculum achievements every year (MONE, 2018b). The studies of Pala and Başıbüyük (2019) and this study support each other when considered together. Understanding tables and graphs is not just a subject area of mathematics or life

science-social science lessons. It is a subject area that is carried out in an interdisciplinary way and taught in a spiral way with details that support each other. In addition, according to another study, the effective and appropriate use of graphics is a factor that increases the success of students in geography lessons (Şahin, Gençtürk, & Budanur, 2007). In her study, Akın-Köse (2011) concluded that teaching with statistics and graphic use activities improved graphic reading skills in the social science lesson. Similarly, in Keskin's (2018) study, the students who were taught activity-based graphic preparation and reading skills in the social science lesson were more successful; their interest and desire for the lesson increased compared to the students who were taught with the current program. Taş (2008) stated that it is useful to include tables and graphics in the teaching process Bekdemir and Başıbüyük (2011) also stated that the ability to read tables and graphics can improve depending on the increase in students' mathematical skills. Therefore, social science and life science lessons (representing the younger age group of social science) can gradually support each other in a positive way at the point of learning the mathematical concepts identified in the study.

In Akgün's (2010) study, it was concluded that students were successful in reading one-dimensional graphics questions, but the success rate of general graphic reading skills was below 50% in two-dimensional (column-line) graphics. In addition, in the question types that require understanding the graph and drawing conclusions, the success of the students remained below 50%. It can be predicted that students who have problems in reading the graphic might /would also have difficulties in terms of graphic literacy. Because graphic literacy includes the skills of establishing relationships between data and interpreting and transforming data beyond reading and understanding graphics (Aoyama, 2007; Bursal, 2019; Curcio, 1987; Özmen, Güven & Kurak, 2020). Moreover, Kranda and Akpınar (2018), conducted a study with seventh grade students of social science lesson, the level of graphic literacy was found to be moderate according to the results of the students' achievement test. Because the social science lesson allows for the creation of many diagrams and concept maps based on visual elements, not only graphics but also graphic organizers can be used within the scope of the lesson. The venn diagram is yet another type of graphic organizer. (Dönmez, Yazıcı & Sabancı, 2007). With the Venn diagram, students can make classifications, and this can be beneficial in providing students with a mathematical perspective in terms of basic math skills, especially on sets.

Table-graph topic is one of the most studied mathematical topics in social studies literature. In this regard, it can be suggested that more studies should be carried out for primary school for the life science lesson. Furthermore, within the scope of life science lesson or in life science-mathematics lessons, with interdisciplinary associations, studies that will improve the graphic literacy of the students in the primary school period, which is the early age group, can be done, and more emphasis can be given to the theme of data analysis.

Third theme: Time calculations:

The concepts of "day", "month", "year" and "hour" in the third grade life science lesson book are associated with the achievements of time calculations in the mathematics curriculum. According to the mathematics curriculum, students in grade three, four and five are expected to learn these concepts and gain the ability to convert them to one another. Life science lesson is important in acquiring these skills and concepts. Students who learn these concepts well will be able to convert time measures to each other more easily in the future. When the literature on the subject is examined, there is a study by Şimşek (2006). In this study, it was concluded that the socio-economic status of the schools as well as their age-related mental development is a factor in the students' acquisition of historical time and related chronology knowledge-skills. In addition, he determined that the students were unsuccessful in the operations they did for the concepts before and after Christ. Although Şimşek's (2006) study is about time and chronology, the results obtained in this study in terms of life science-mathematics lessons, it has been discussed from a different perspective as it is for time calculations. This shows that the two studies touch on different places in terms of time. Kekeç (2018) also used the modeling technique for time and chronology skills in his study and concluded that the model-base teaching improved the time-chronology skills of the students.

Fourth theme: Basic mathematics skills:

In this theme, mathematical concepts are formed in two different sections. The concepts in the first group are "budget", "attitude", "investment" and "conscious consumption". Learning these concepts at an early age by students in the life science lesson makes it easier to solve the questions related to these issues in the mathematics lesson later on. In order to ensure that the concepts are better understood by the students, it may be beneficial to teach the third-grade mathematics lesson simultaneously with the life science lesson, and to support one another in an interdisciplinary manner with a holistic approach. For example, while the concept of "budget" is taught in the life science lesson, students can create a weekly income-expense table with their pocket money in the mathematics lesson. In this way, students can learn and reinforce the same concept in terms of two different lessons in the same week. Similarly, the concepts of "attitude", "investment" and "conscious consumption", which are taught in the life science lesson, can be supported simultaneously with the mathematics lesson. While the subject of "conscious consumption" is taught in the life science lesson, questions that mainly involve conscious consumption activities can be designed in the scenarios of the subject in the curriculum of that week in the mathematics lesson. This situation can be discussed with the students in the classroom environment, and students' ideas about the causes and effects of conscious consumption can be obtained. Thus, a concept that includes both courses can be processed in an interdisciplinary way.

"Excess (Gradation)", "number", "division" codes were determined as the second group of the fourth theme. The codes identified in this section are mainly for basic mathematics skills. The "divide" code is a code formed within the scope of four operational skills. The four basic processing skills take place in all areas of life; it is always up to date and students do not need to do any additional work to understand the four operations after a certain period of time. Before performing the four operations, the mind determines with the decision-making stages and continues to make sense in the thinking stage. So, this is a systematic process. Skills such as recognizing and reading numbers, visualizing the date indicated by the numbers, knowing the expiration date of products are also skills that are always encountered in daily life. "Excess" code is also a basic mathematical concept that students should know in determining extreme values such as few-many, minimum, maximum; contributes to the formation of quantitative-logic reasoning skills. According to Akgün (2010), students have difficulty in finding the average of the hottest and coldest months in the graphs. When this situation is considered in terms of general mathematics skills, it shows that the concept of "at most" in this section can also be associated with one of the other codes, table-graphs. In this sense, codes and themes can be associated with each other and support each other as seen. Learning a concept (code) in a life science lesson can help to learn another acquisition for the mathematics lesson at next grade levels, as well as contribute to learning another concept in the life science lesson. From this point of view, it can be concluded that there is both a vertical and a horizontal correlation between concepts and achievements. As a result, students' understanding of the "excess" code can improve their quantitative-logic reasoning skills. This contributes to both life science and mathematics lessons. Within the scope of realistic mathematics education theory, life science can serve as a leading course for all these concepts in general related to mathematics, and the use of mathematical language related to daily life can be used more in the life science lesson, and in this way, mathematical literacy can be improved by increasing the general mathematics skills of the students. The advantage of using up-to-date theories such as realistic mathematics education with other courses is very important for students, these theories should find more place in teaching activities, theoretical foundations should be included in the curriculum more clearly and not implicitly. The curricula of both courses can be restructured to deal with the subjects in coordination and can be built on experience rather than daily life.

Regarding the Fifth Sub-Purpose:

For the theme of "locating and drawing", the achievements in the mathematics curriculum from the third to the eighth grade are divided into two. While the achievements associated with the mathematics lesson for "location determination" are in the fifth and eighth grades, the environment and area questions to which the sketch drawing is associated are available from third to seventh grades. Although the two codes that are separated in themselves do not show continuity, the theme created with its combined form shows continuity in the curriculum.

The second theme, "Data analysis", shows continuity in terms of associating the achievements of the third to eighth grade mathematics curriculum and is the theme with the most achievements. When viewed interdisciplinary, it is a theme that is carried out together with other courses.

The third theme, "Time calculations", is included only in the third, fourth and fifth grades in the mathematics curriculum, and there are no acquisitions of this theme in the next grade levels.

The codes that make up the fourth theme are divided into two groups as A and B. The "budget", "attitude", "investment" and "conscious consumption" codes related to the group A are directly applied in the third, fourth and fifth grades; also in the seventh grade, it can be indirectly associated with the achievements of the mathematics curriculum within the subject of percentages. Therefore, the concepts in this theme do not show continuity in terms of mathematics curriculum. Continuity of the program can be ensured by using these concepts at the sixth and eighth grade levels.

For the group B, there are "excess", "number" and "division" codes. Since the "number" and "division" codes are general basic concepts, it was not necessary to associate them with mathematics achievements in the study. However, since the concept of "excess" includes quantity and reasoning skills, the association of achievements in the mathematics teaching program was taken into consideration. It was determined that there are third and sixth grade achievements in the mathematics curriculum related to the "excess" code. The concepts mentioned as codes above regarding basic mathematics skills can be given more space in textbooks. The study is limited in that it only examines the third-grade primary school life sciences textbook.

References

Akgün, İ. H. (2010). *The level of gaining graphic reading and preparation skills of 7th grade primary school social studies students*. [Unpublished Master's Thesis], Niğde University.

Akın-Köse, M. (2011). *The effect of statistics and graphic usage techniques on students' graphic reading skills in social studies teaching*. [Unpublished Master's Thesis], Gazi University.

Aktepe, V., Cepheci, E., Irmak, S. & Palaz, Ş. (2017). A theoretical study on concept teaching and techniques that can be used in concept teaching in the Life Science lesson. *Journal of International Social Sciences Education*, *3*(1), 33-50.

Altun, M. (2013). *Teaching Mathematics for Education Faculties and Primary Teachers*.Aktüel Alfa.

Aoyama, K. (2007). Investigating a hierarchy of students' interpretations of graphs. *International Electronic Journal of Mathematics Education, 2*(3), 298-318.

Ataşçi, A. (2018). *Primary School Third Grade Textbook*. Pasifik.

Aybek, Ö. G. B. (2001). Evaluation of the relationship between primary school fourth grade social studies teaching and social and other sciences. *Çukurova University Journal of Social Sciences Institute*,7(7), 34-48.

Baş, M., Işık-Tertemiz, N. & Tay, B.(2021). The effect of integrated mathematics and life sciences teaching on the attitude levels of 3rd grade primary school students towards lessons. *Tay Journal, 5*(2),158-180

Bekdemir, M. & Başıbüyük, A. (2011). Predicting geography success of mathematics achievement and anxiety levels of social studies and classroom teaching program students. *Journal of Gazi Education Faculty*, *31*(2), 459-477.

Bektaş, M. (2007). The effect of the way families are informed about the theory of multiple intelligences in the life science lesson on the students' project achievements and attitudes. *Journal of Values Education*, *5*(14), 9-28.

Curcio, F. R. (1987). Comprehension of mathematical relationships expressed in graphs. *Journal for Research in Mathematics Education, 18*(5), 382-393.

Çilingir, E. (2015). *The effect of realistic mathematics education approach on visual mathematics literacy level and problem solving skills of primary school students*. [Master Thesis], Çukurova University Institute of Social Sciences.

Dönmez, C., Yazıcı, K. & Sabancı, A. (2007). The effect of using graphic organizers in social studies lessons on students' acquiring academic knowledge. *Turkish Journal of Educational Sciences*, *5*(3), 437-459.

Erdoğan, A. & Özdemir Erdoğan, E. (2009). Teaching addition and subtraction concepts and student difficulties,

E. Bingölbali ve M. F. Özmantar (Eds.), Mathematical Difficulties Encountered in Primary Education and Solution Suggestions, Pegem A

Fannin, K. (2017). Transitioning to concept-based curriculum and instructıon. *Curriculum and Teaching Dialogue, 19* (1/2), 157-170.

Freudenthal, H. (1991). *Revisiting Mathematics Education*. Kluwer Academic.

Furinghetti, F. (2000). The history of mathematics as a coupling link between secondary and university teaching. *International Journal of Mathematical Education in Science and Technology*, *31*(1), 43-51.

Gravemeijer, K. (1994). *Developing Realistic Mathematics Education*. Utrecht: CD-ß Press /Freudenthal Institute.

Kablan, Z. & Bozkuş, F. (2021). Teacher and student views on mathematics problems in high school entrance exams. *Journal of Mersin University Faculty of Education*, *17*(1) , 211-231

Kammeenui, E. J. & Simmons, D.C. (1999). *Desingning in Structiona lstraregies the Prevention of Academic Learning problems*. Merill

Kara, N. (2021). *Examination of Life Sciences Course in Terms of Interdisciplinary Teachin*. [Master Thesis], Anadolu University.

Kekeç, M. (2018). *Use of modeling technique in gaining time and chronology skills*. [Master Thesis], Karadeniz Technical University.

Keskin, G. (2018). *Examining the contribution of activities based on graphic preparation and reading skills to academic success in social studies course*. [Unpublished Master's Thesis], Aksaray University.

Kranda, S. & Akpınar, M. (2018). Determination of graphic literacy levels of seventh grade students in social studies course. *Kırşehir Education Faculty Journal*, *19*(3), 2445-2458.

Kuzey, M. (2016). *An investigation on map and directional literacy of secondary school students*. [Unpublished Doctoral Thesis], Atatürk University.

MONE, (2018a). *Social Studies Curriculum (Primary and Secondary School Fourth, Fifth, Sixth and Seventh Grades.*https://mufredat.meb.gov.tr/Dosyalar/201812103847686SOSYAL%20B%C4%B0LG%C4%B0LER%20%C3%96%C4%9ERET%C4%B0M%20PROGRAMI%20.pdf). It was downloaded on 14.03.2021.

MONE, (2018b). *Mathematics Curriculum (Primary and Secondary Schools 1, 2, 3, 4, 5, 6, 7 and Eighth Grades)*.http://mufredat.meb.gov.tr/Dosyalar/201813017165445-MATEMAT%C4%B0K%20%C3%96%C4%9ERET%C4%B0M%20PROGRAMI%202018v.pdf. It was downloaded on 02.05.2021.

Özden, Y. (2005). *Learning and Teaching*. Pegem

Özmen, Z. M., Güven, B. & Kurak, Y. (2020). Determining the graphical literacy levels of 8th grade students. *Eurasian Journal of Educational Research*, 86, 269-292.

Pala, Ş. M. & Başıbüyük, A. (2019). The effect of mathematics skills on map, graph and table reading skills in social studies lessons. *International Journal of New Approaches in Social Studies*, *3*(1), 41-56.

Sönmez, Ö. F. (2010). *Map skills in primary school social studies teaching*. [Unpublished Doctoral Thesis], Gazi University.

Şahin, S., Gençtürk, E. & Budanur, T. (2007). The effect of appropriate graphic selection and use on learning in geography teaching. *Kastamonu Journal of Education*, *15*(1), 293-302.

Şahinkaya, N. & Aladağ, E. (2009). Evaluation of associating social studies lesson with mathematics lesson in primary school social studies program. *Kafkas University Journal of Social Sciences Institute*,*1*(4) , 103-123.

Şimşek, A. (2006). *The development and teaching of the concept of historical time in primary school students*. [Doctoral Thesis], Gazi University.

Taş, H. İ. (2008). Geographical skills and ways to teach them to students. *Eastern Geography Journal*, *13*(20), 45-58.

Tay, B. & Yıldırım, K. (2013). The effect of computer-assisted teaching on success in life sciences teaching lesson and the opinions of pre-service teachers about the method. *Uşak University Journal of Social Sciences,* 12, 84-110.

Tural, A. (2011) *Model development for concept teaching with a constructivist approach in Social Sciences*. [Doctoral Thesis], Gazi University.

Ütkür Güllühan, N., & Bekiroğlu, D. (2022). 2018 Examination of life sciences curriculum in terms of cognitive, affective and psychomotor domains. *Uluslararası Temel Eğitim Dergisi*, 6(1), 24–36

Van den Heuvel-Panheuizen, M. (2003). The didactical use of models in realistic mathematics education: an example from a longitudinal trajectory on percentage. *Educational Studies in Mathematics*, *54*(1), 9-35.

Yıldız, C. (2019). Social studies and mathematics. İ.Hakkı Demircioğlu, Selahattin Kaymakcı ve Ebru Demircioğlu (Ed.), *In the Handbook of Social Studies Education Research ın Turkey* (p. 359-379), Pegem Akademi.

Yıldızlar, M. (1999). *The effect of teaching problem solving behaviors in primary school first, second and thirrd grade students on their success in problem solving and their attitudes towards mathematics*. [Unpublished Doctoral Thesis], Hacettepe University.

Zulkardi. (2002). *Developing a learning environment on realistic mathematics education for ındonesian student teachers*.[Doctoral Thesis]. Thesis Univesity of Twente, Enschede.

Genişletilmiş Türkçe Özet

Araştırmada üçüncü sınıf hayat bilgisi ders kitabında bulunan matematiksel kavramların belirlenmesi ve bu kavramların matematik dersi (3. Sınıftan 8.sınıfa kadar olan) kazanımları açısından incelenmesi amaçlanmıştır.

Çalışmada incelenen iki farklı alanın (hayat bilgisi ve matematik) kavramlarının erken yaşlarda öğrenilebilmesi, öğrencilerin zihinlerini çok yönlü şekilde kullanmalarına olanak sağlar. Hayat bilgisi dersi ilkokulda günlük hayata güncel şekilde adapte olmaya çalışan çocuklara yol gösterici niteliğinde önemli bir derstir. Dolayısıyla çocukların günlük hayatta kullandıkları birçok pratik bilgiyle beraber, bilişsel ve duyuşsal becerilerinin gelişmesine katkı sağlar (Özden, 2005). Bu yüzden bu derste işlenen kavramlar, çocukların bilgiyi günlük hayata transfer edebilmesinde ve 21. yüzyıl becerilerine uygun bireyler olarak yetişmesinde rol oynar. Matematik dersi de düşünme biçimini geliştirmeye yarayan en etkili disiplinlerden biridir. Yıldızlar'a (1999) göre, matematiksel düşünmeyi gerçekleştirebilen bir birey hayatta karşılaştığı problemlere farklı bir bakış açısıyla yaklaşabilir, bu problemleri zorlanmadan çözebilir. Hollandalı matematikçi Hans Freudenthal'in önderliğinde 1970'li yıllarda geliştirilen gerçekçi matematik eğitimi (Witmann, 2005) gibi günümüzde güncelliğini koruyabilmiş matematiksel kuramlar bu noktada önem taşır. Çünkü Çilingir'e (2015) göre gerçekçi matematik eğitimi kuramıyla öğrenciler, günlük hayatla ilişkisi olan problemleri, o soruyu çözmeye ihtiyaç hissettiği için çözebilir, problemi ilgi çekici bulabilir. "Bu bizim ne işimize yarayacak?" sorusunun yanıtını problemi çözerken gerçekçi matematik eğitimi kuramı sayesinde anlamlandırabilir. Freudenthal (1991) ise matematiğin gerçeklikle doğrudan ilişkili olmasını, insani değerler taşımasını ve toplumun yapısına uygun olmasını beklemektedir. Bu açıdan bakıldığında gerçekçi matematik eğitimi kuramının toplum ve insanın ihtiyaçlarını karşılayan hayat bilgisi dersiyle de ne kadar iç içe olabileceği görülmektedir. Bu yüzden matematik dersine özgü gibi görünen gerçekçi matematik eğitimi gibi kuramlar aslında hayat bilgisi dersinde de disiplinler arası ve koordinasyonel olarak işlenmeye müsaittir ve öğrenci açısından verimli bir öğrenme ortamı sağlayabilir. Bu yüzden çalışma, bu iki farklı alanın ilkokul ve ortaokulda bütüncül şekilde ele alınmasıyla beraber, üçüncü sınıf hayat bilgisi ders kitabında yer alan matematiksel kavramların (3.sınıftan sekizinci sınıfa kadar olan) matematik kazanımlarıyla ilişkisini belirlemesi yönüyle birçok çalışmaya doğrudan ya da dolaylı katkı sağlayabilir. Çalışmanın bu sebeple önem taşıdığı düşünülmektedir. Çalışmanın bir diğer önemi de literatür incelendiğinde hayat bilgisi ve matematik dersinin birlikte sentezlendiği çok fazla çalışmaya rastlanılamamış olmasından dolayıdır. Çalışma, bu yönüyle de alana katkı sağlayabilir.

Araştırmada nitel araştırma yöntemlerinden doküman analizi tekniği kullanılmıştır. 2021 yılında MEB tarafından kullanılan Pasifik Yayıncılık üçüncü sınıf Hayat bilgisi ders kitabı incelenmiştir. İnceleme sonucunda öncelikle alan uzmanları ve araştırmacının üzerinde uyum sağladığı matematik ile ilgili olan kavramlar belirlenmiştir. Kavramlar tespit edilirken, "hangi ünite içerisinde, hangi konu başlığında, sayfa numarası kaç, kullanım alanı nerede?" gibi sorular düşünülerek bu değişkenler Tablo 1 aracılığıyla

bütüncül şekilde ifade edilmeye çalışılmıştır. Veri analizinde alt amaçların niteliğine göre betimsel ve içerik analizi tekniklerinden yararlanılmıştır. 2021 yılında okullarda yürütülen üçüncü sınıf Hayat bilgisi ders kitabında yer alan matematiksel kavramların, hangi ünite ile konu içerisinde yer aldığı ve üçüncü sınıftan sekizinci sınıfa kadar olan sınıf düzeylerinde matematik öğretim programında yer alan kazanımlar açısından süreklilik gösterme durumu, betimsel analiz tekniği kullanılarak incelenmiştir.

2021 yılında okullarda yürütülen üçüncü sınıf Hayat bilgisi ders kitabında yer alan matematiksel kavramların neler olduğu, nasıl sınıflandığı ve üçüncü sınıftan sekizinci sınıfa kadar olan sınıf düzeylerinde matematik öğretim programında yer alan kazanımlar açısından nasıl inceleneceği alt amaçların analizinde ise içerik analizi tekniği kullanılmıştır. Yapılan içerik analizi sonucu elde edilen matematiksel kavramlar, kod başlıkları altında gruplanmıştır. Daha sonra kodların genel adını yansıtacak kategori (kullanım alanları) ve temalar (en genel başlıklar) elde edilmiştir. Çalışmada 4 tema belirlenmiştir. Bu temalar, "konum belirleme ve çizim", "veri analizi", "zaman hesaplamaları" ve "temel matematik bilgisi" şeklinde ifade edilmiştir. Bu temalara bağlı kategoriler ve kategorileri oluşturan ilişkili matematiksel kavramlar, ünite ve konu dağılımı açısından belirlenmiştir. Üçüncü sınıf hayat bilgisi ders kitabında bulunan matematiksel kavramların üçüncü ve sekizinci sınıf arasındaki matematik kazanımları ile ilgili olanları keşfedilmeye çalışılmıştır.

 "Veri analizi" temasının en çok matematik kazanımı ile ilgisi olan tema olduğu ve sarmal şekilde tüm sınıf düzeylerinde matematik kazanımı olarak süreklilik gösterdiği görülmüştür. "Konum belirleme ve çizim" teması da dolaylı şekilde süreklilik gösterirken, "zaman hesaplamaları" ve "temel matematik bilgisi" temaları süreklilik göstermemektedir. Tüm üniteler içerisinde, ilgili ders kitabında matematik ile ilgili toplam 19 kavramının mevcut olduğu ve altıncı ünite hariç, her ünitede matematiksel kavram olduğu görülmektedir. Araştırmada hayat bilgisi ders kitabında belirlenen matematiksel kavramlar ve ilişkili matematiksel kazanımlar üst düzey düşünme becerileri açısından yorumlanmıştır.

Ethics Committee Approval: Since the method of this research does not include any human element, ethic committee approval has not been required.

Peer Review: Externally peer-reviewed.

Authors' Contribution: Concept – P.Ş.H.., D.Y.; Design – P.Ş.H., D.Y.; Data Collection and Processing – D.Y.; Analysis and Interpretation – P.Ş.H., D.Y; Literature, Review – P.Ş.H.; Writing – P.Ş.H., D.Y..; Critical Review – All authors.

Conflict of Interests: The authors have no conflict of interest to disclose.

Financial Disclosure: The authors declared that this study has received no financial support

Authors	Contact
Perihan Şara Hürsoy	Uşak University, Türkiye
	E-mail: perihan.sara@usak.edu.tr
Doğan Yalçın	Phd Student, Ministry of National Education, Türkiye