OPEN ACCESS

Manuscript ID:
EDU-2024-13018132

Volume: 13

Issue: 1

Month: December

Year: 2024

P-ISSN: 2320-2653

E-ISSN: 2582-1334

Received: 05.10.2024

Accepted: 20.11.2024

Published Online: 01.12.2024

Citation:
Özçakir, B. (2024). Investigating Learning Tasks in the Century of Turkey Education Model 5th Grade Mathematics Textbook: Financial Literacy Education and Cognitive Demand Level. *Shanlax International Journal of Education*, *13*(1), 108-118.

DOI:
https://doi.org/10.34293/education.v13i1.8132

This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License

Investigating Learning Tasks in the Century of Turkey Education Model 5th Grade Mathematics Textbook: Financial Literacy Education and Cognitive Demand Level

Bilal Özçakir
Alanya Alaadin Keykubat University, Turkey
https://orcid.org/0000-0003-2852-1791

Abstract
The Century of Turkey Education Model, introduced in 2024, emphasizes developing critical thinking and analytical skills, with the Mathematics Curriculum. This curriculum integrates literacy skills in learning objectives, particularly financial literacy, to empower students in making informed economic decisions and managing resources effectively. Research highlights the strong link between cognitive skills and financial literacy, noting that individuals with higher cognitive abilities excel in financial literacy and make better financial decisions. Since mathematics textbooks, play a crucial role in fostering these skills by incorporating tasks that enhance cognitive and analytical abilities, this study investigates financial literacy related tasks in the 5th-grade mathematics textbook and assesses requested cognitive demand to complete these tasks. These tasks were identified based on the PISA Financial Literacy Framework's content dimension. The findings indicated that learning tasks related to financial literacy are primarily concentrated under the 'Numbers and Quantities' theme. Moreover, in the 'Geometric Shapes' or 'From Data to Probability' themes, learning tasks could not be categorized under any subcategories of content dimension. On the other hand, regarding the PISA financial literacy content dimension, the learning tasks were mostly related with the 'Money and Transactions' subcategory. Additionally, in terms of cognitive demand levels, most tasks were categorized as requiring 'High-Level Cognitive Demand', with only a few tasks involving 'Low-Level Cognitive Demand' like memorization. This imbalance suggests a need for greater diversity in task types and cognitive demand levels to ensure a more comprehensive and inclusive approach to financial literacy education.

Keywords: Financial Literacy Education, Cognitive Demand, PISA Financial Literacy Domains, Mathematics Education, Mathematics Textbook

Introduction

As of 2024, Turkey has implemented a new curriculum framework titled the 'Century of Turkey Education Model', which emphasizes fostering a generation of students who are encouraged to think critically and interrogate effectively (MoNE, 2024a). In this study, the 'Middle School Mathematics Curriculum', designed according to the Century of Turkey Education Model, will be focused. Unlike the previous mathematics curriculum (MoNE, 2018), this new curriculum adopts a thematic approach rather than a domain-based structure. Furthermore, literacy skills, considered fundamental components of the themes, are incorporated among the principles guiding the implementation of the curriculum. The importance of literacy skills is highlighted as follows in the curriculum (MoNE, 2024a):

Literacy skills are critical variables that facilitate the acquisition of competencies targeted by the education system. To navigate social life successfully, exercise their rights, and fulfil their responsibilities, individuals must be educated in contemporary areas such as digital literacy, financial literacy, and sustainability literacy. These skills encompass knowledge, abilities, and proficiencies essential for meeting the demands of the modern era.

While acknowledging that all types of literacy are worthy of exploration, financial literacy deserves particular attention due to its role in enhancing individuals' capacity to make educated economic decisions and manage resources effectively (Lusardi, 2006; OECD, 2009). Financial literacy can be defined as the ability of an individual to not only acquire knowledge about basic topics such as investment, savings, deposits, loans, types of interest, inflation, and financial risk but also to use this knowledge to consciously manage their income and expenses and develop responsible financial behaviors accordingly. (OECD, 2013; 2014). Accordingly, financial literacy involves the skills that enable individuals to make sustainable investment decisions, which eventually contribute to economic stability. Research indicates that cognitive skills and financial knowledge are closely related (Muñoz-Murillo et al., 2020; Paolacci & Legrenzi, 2012; Roa et al., 2018) and individuals with higher cognitive skills perform a high level of financial literacy (Muñoz-Murillo et al., 2020). In addition, it is stated that cognitive characteristics of individuals could also be associated with making right financial decisions (Roa et al., 2018).

In literature, it was stated that education have a critical role in enhancing individuals' financial knowledge and literacy (Garg & Singh, 2018; Pang, 2010; Pesando, 2018). In this manner, mathematics lessons could be a way to present financial knowledge and operations through problems and learning tasks,which include financial contexts such as money, shopping, price calculations, and profit-loss (Muñoz-Murillo et al., 2020). In order to provide these opportunities, mathematics textbooks and curricula must include learning tasks, activities and learning objectives in line with the components of financial literacy.

PISA Financial Literacy Framework

OECD (2013, 2023) provides a comprehensive reports of PISA applications and assessment resultsfor how students apply their knowledge and skills in the problems and tasks related with financial contexts. Since financial literacy improves individuals' capacity to make economic choices and manage their resources effectively, the PISA financial literacy framework serves as an important reference point for understanding components of financial literacy and characteristic of the tasks (OECD, 2023).

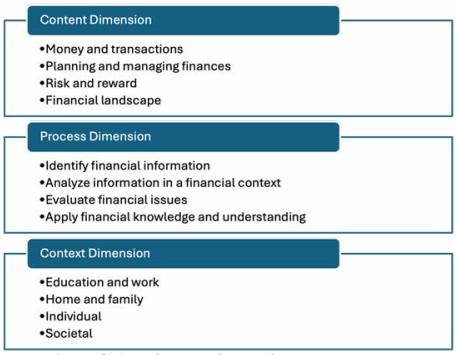

Figure 1 PISA Financial Literacy Framework Dimensions and Subcategories

The PISA financial literacy framework (Figure 1) is organized based on three main dimensions: content, process, and context (OECD, 2013). Content dimension classifies four key areas of financial literacy to perform a particular task. The process dimension assesses students' abilities to identify, analyze, evaluate, and apply financial knowledge. Lastly, the context dimension explains different types of contexts and situations which could be considered to assess students' literacy. This framework is designed to support individuals in applying their financial knowledge and skills across everyday life to societal decision-making. In general, the content dimension in this framework defines knowledge and understanding required to complete specific tasks (OECD, 2013). Therefore, this dimension can be utilized to evaluate the extent to which the tasks in middle school mathematics textbooks address financial literacy education in terms of content since this study mainly aims to investigate the mathematics textbook of fifth graders to understand how the connections between financial

literacy and learning objectives are reflected in the learning tasks in the textbook.

The content dimension is structured into four main subcategories aimed at enhancing individuals' financial knowledge and skills (OECD, 2013). Money and Transactions subcategory provides characteristics of task which could help students understand the various forms and purposes of money while developing the ability to carry out and monitor financial transactions confidently. Planning and Managing Finances subcategory involves characteristics of task for tracking and controlling income and expenses. Risk and Reward subcategory involves tasks that provides students opportunities to understand the consequences of a financial decision, assess risks by considering and evaluating potential outcomes, and make wise choices by considering alternative solutions. Lastly, Financial Landscape subcategory defines task characteristics to enhance awareness of rights and obligations in economics, credibility of financial resources and effects of external influences on financial decisions (OECD, 2013, 2023).

In summary, since this framework provides some key characteristics for learning and assessment tasks in compliance with financial literacy, it could provide a foundation for investigating and understanding how financial literacy are integrated into curricula of the Century of Turkey Education Model.

Cognitive Demand Levels of Mathematical Tasks and Their Impact on Learning

In mathematics learning environment, problems and learning tasks could be presented within financial context. Especially in problems and tasks regarding with numbers, operations and measurement concepts include real life situations with money calculation, pricing and shopping examples as well as finding most economic situations. Therefore, students' financial literacy would benefit from the numerical analysis, logical reasoning, and problem-solving skills that can be developed through these tasks and problems. Thus, it is essential to classify these tasks and problems according to cognitive characteristics in order to understand how students apply and develop higher order thinking abilities (Stein et al., 1996).

Smith and Stein's (1998) framework for learning tasks is widely used to categorize mathematical learning tasks according to their levels of cognitive demand. In this framework, tasks with low cognitive demand involve 'memorization' and 'procedures without connections', whereas tasks with high cognitive demand involve 'procedures with connections' and 'doing mathematics'. The memorization tasks involve recalling previously learned rules, facts, formulas or definitions without connecting meaning or justification of concepts. The procedures without connection tasks involve algorithmic procedures with limited cognitive demands to be successful without making connection concepts that explain procedure being used. Since there are no need to connect recalled rules, facts, formulas or definition, and used operations or procedures with concepts, these two tasks identified as low cognitive demand tasks. On the other hand, the procedures with connections and doing mathematics tasks involve more complex cognitive processes. The procedure with connections task involves using procedures to develop deeper understanding about concepts and ideas, as well as representing these concepts with multiple representations. The doing mathematics task involve complex and non-algorithmic thinking and require exploring concepts in detail by accessing underlying meanings and definitions of concepts. Since these two types of tasks are mostly focused on meaning and definition of concepts, they require high cognitive demand from students (Smith & Stein, 1998).

The cognitive demand levels required by tasks in textbooks directly influence students' performance and the learning opportunities (Hadar, 2017). In this context, identifying the cognitive demand levels of tasks included in textbooks becomes a matter of significant importance. Moreover, learning with low and high cognitive demand tasks provide the potential of engaging students in meaningful mathematical learning and promote deeper conceptual understanding (Stillman, 1996).

Given the connections between financial contexts and mathematical concepts and operations, mathematics textbooks could serve as a tool for financial literacy education, particularly at the middle school level in Turkey. Because there is no separate

curriculum for financial literacy education in Turkey. However, the middle school mathematics curriculum (MoNE, 2024a), designed in line with the Century of Turkey Education Model, specifically mentions financial literacy as a literacy skill and provide direct connections between some learning objectives and financial literacy (MoNE, 2024a; 2024b). In this regard, this study aims to investigate the learning tasks in the fifth-grade middle school mathematics textbook to understand how the connections between financial literacy and learning objectives are reflected in the learning tasks in the textbook. Additionally, since research suggests a relationship between cognitive characteristics and the financial decision-making process, understanding the required cognitive demands for the completion of these learning tasks is another goal. This study also represents one of the first efforts to understand how financial literacy is addressed in the mathematics curriculum designed regarding the Century of Turkey Education Model.

Methodology

Research Model

The main aim of this study was to analyze relationships between the learning tasks in the fifth-grade middle school mathematics textbook and components of financial literacy. Moreover, the learning tasks in this textbook were categorized based on the cognitive demand levels in order to understand required cognitive process to complete these tasks. The analysis of cognitive demand was guided by the framework defined and characterized by Smith and Stein (1998). Additionally, the analysis of components of financial literacy was based on the subcategories of the content domain of the PISA Financial Literacy Framework (OECD, 2013; 2023). In this regard, this study employs the document analysis method, which involves a detailed examination of written or printed materials.

Data Sources

The data source for this study was the fifth-grade mathematics textbooks (Albayrak et al. 2024a; 2024b) published by the Ministry of National Education Publications and accessible on the 'Century of Turkey Education Model' website as well as on the Education Information Network platform of MoNE. The textbooks were presented in two volumes. These two volumes were considered as a single textbook in this study. The mathematics curriculum (MoNE, 2024a) presented within the framework of the Century of Turkey Education Model (MoNE, 2024b) was implemented starting from the 2024-2025 academic year, beginning with fifth-grade students. This curriculum is currently applied exclusively at the fifth-grade level in middle schools. Therefore, textbook focused on this study was the first mathematics textbook prepared as part of the mathematics curriculum based on the 'Century of Turkey Education Model' (MoNE, 2024a). Therefore, the study focused on analyzing the fifth-grade mathematics textbooks in terms of learning tasks. Within the scope of the study, the learning tasks in the textbooks include activities expected to be completed by students, problem-solving tasks, questions with/without solutions, assessment questions, and applied tasks. These components are considered as learning tasks and have been examined in detail.

Data Analysis

Initially, numerous learning tasks in the textbook were considered; however, after evaluating their alignment with the PISA Financial Literacy Framework (content dimension), 33 tasks were identified for analysis. These selected tasks were then examined in terms of the levels of cognitive demand required for their completion, as classified and characterized by Smith and Stein (1998). Additionally, they were further analyzed based on the content dimensions of the PISA Financial Literacy Framework. Data were analyzed using the content analysis method, a technique aimed at extracting concepts and relationships from qualitative data and were interpreted through a descriptive and analytical approach (Krippendorff, 2018; Mayring, 2015).

Initially, all tasks included in the fifth-grade mathematics textbook were analyzed. Subsequently, these tasks were classified according to the criteria outlined in the PISA Financial Literacy Framework (OECD, 2023), focusing on the subcategories of the content dimension (Figure 2).

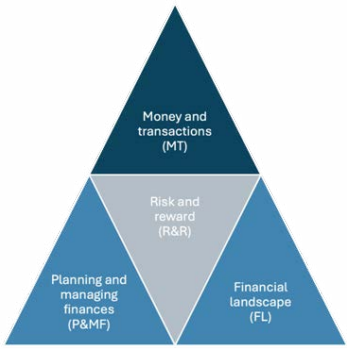

Figure 2 Subcategories of PISA Financial Literacy Framework Content Dimension

To determine the relations of each learning task with these subcategories, the tasks were independently coded and classified by the researcher and an expert with doctoral degrees in mathematics education. Any inconsistencies in coding were addressed through discussion sessions. During these sessions, justifications for coding tasks to specific financial literacy subcategories were shared, and consensus was reached on the most appropriate classifications. As a result of these discussions, the Miles and Huberman (1994) agreement coefficient was calculated as 87% among researcher and the expert. Ultimately, it was observed that the 33 learning tasks were aligned with the content dimension of the Framework

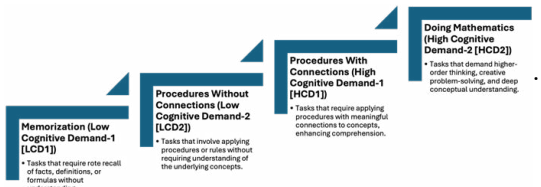

Figure 3 Codes for Levels of Cognitive Demands

Once the financial literacy types of tasks were identified, the cognitive demand levels required for completing these learning tasks were determined. Based on the classification developed by Smith and Stein (1998), cognitive demand levels were coded as in Figure 3. In the process of examining and categorizing each learning task based on cognitive demand levels (Smith & Stein, 1998), the researcher and the same expert in the field independently coded the tasks. Inconsistencies in coding among the researcher and the expert were addressed through discussion sessions resembling those used in the classification process. Through these discussions, consensus was achieved on the most appropriate codes. The agreement coefficient, Miles and Huberman (1994) was calculated at 94% between researcher and the expert. After this data analysis was completed, the final codes for the tasks were established, these codes allow the identification of the cognitive demand levels and financial literacy relations of tasks within the themes in textbook.

Findings

According to the findings of the study, the mathematics learning tasks in the fifth-grade mathematics textbook (Albayrak et al. 2024a, 2024b) were found to have significant potential to provide financial literacy education in mathematics lessons. In addition, the cognitive demand levels expected from students to complete these tasks were also identified and reported.

Analysis of Learning Tasks based on PISA Financial Literacy and Learning Themes

Firstly, the 33 learning tasks in the textbook, which were found financial literacy-related, were analyzed based on the learning themes specified in the mathematics curriculum. This analysis focused on the alignment of these tasks with the content dimension of the PISA Financial Literacy Framework (Table 1).

Table 1 The Distribution of Financial Literacy Tasks based on the Themes in the Mathematics Curriculum

Themes	Subcategories in Content Dimension of PISA Financial Literacy Framework				Total
	MT	P&MF	R&R	FL	
Numbers and Quantities	10	8	1	0	19
Algebraic Thinking with Operations	1	2	0	0	3
Geometric Shapes	0	0	0	0	0
Geometric Quantities	4	1	0	0	5

Statistical Inquiry Process	1	1	3	1	6
From Data to Probability	0	0	0	0	0
Total	16	12	4	1	33

According to the findings, the Numbers and Quantities theme has the highest number of tasks in terms of financial literacy. Under this theme, there are 10 tasks in the 'Money and Transactions' subcategory, 8 tasks in the 'Planning and Managing Finances' subcategory, and 1 task in the 'Risk and Reward' subcategory, and no tasks in the 'Financial Landscape' subcategory. This result showed that the theme of Numbers and Quantities has great potential for the development of financial literacy skills in mathematics classes. However, the tasks in the Algebraic Thinking with Operations theme were related only 'Money and Transactions' with 1 task and 'Planning and Managing Finances' with two tasks. Similarly, the tasks in the Geometric Quantities theme were also related with these subcategories by low number of tasks, including 4 tasks in the 'Money and Transactions' subcategory and 1 task in the 'Planning and Managing Finances' subcategory. On the other hand, in the theme of Statistical Inquiry Processes, there was one task each in the 'Money and Transactions', 'Planning and Managing Finances', and 'Financial Landscape' subcategories, and three tasks in the 'Risk and Reward' subcategory. The only task classified under the 'Financial Landscape' subcategory was also associated with this theme. However, learning tasks in the Geometric Shapes and the From Data to Probability themes did not possess characteristics for the content domain of the PISA financial literacy framework.

In general, the 'Money and Transactions' subcategory was the most represented with 16 tasks in content dimension of PISA Framework. This was followed by the 'Planning and Managing Finances' subcategory, which includes 12 tasks. The 'Risk and Reward' subcategory contained 4 tasks, while the 'Financial Landscape' subcategory was represented by only 1 task. Based on these findings, it can be inferred that while some themes in the textbook are rich in content for financial literacy education, others lack tasks that support such education.

Analysis of Learning Tasks based on Levels of Cognitive Demands and Learning Themes

According to the findings of the study, the learning tasks identified in each theme as suitable for supporting financial literacy education in mathematics lessons address both low and high levels of cognitive demand (Table 2).

Table 2 Distribution of Cognitive Demand of Tasks Based on the Themes in the Curriculum

	Low Level Cognitive Demand		High Level Cognitive Demand		
Themes	**LCD 1**	**LCD 2**	**HCD 1**	**HCD 2**	**Total**
Numbers and Quantities	3	6	7	3	19
Algebraic Thinking with Operations	0	0	2	1	3
Geometric Shapes	0	0	0	0	0
Geometric Quantities	0	1	1	3	5
Statistical Inquiry Process	0	1	1	4	6
From Data to Probability	0	0	0	0	0
Total	3	8	11	11	33

The 33 tasks found suitable for financial literacy education in the textbook were analyzed based on their cognitive demand levels (Low Cognitive Demand - LCD, High Cognitive Demand - HCD). The analysis revealed that the tasks are distributed across specific themes, with some themes lacking tasks appropriate for financial literacy education. The Numbers and Quantities theme emerged as the richest in terms of content for financial literacy education, with a total of 19 tasks. Within this theme, there were 9 tasks at the low cognitive demand level (LCD1: 3, LCD2: 6) and 10 tasks at the high cognitive demand level (HCD1: 7, HCD2: 3). The fact that the Numbers and Quantities theme interested to both

low and high cognitive demand levels indicates that the tasks within this theme supported a wide range of cognitive development. The Algebraic Thinking with Operations theme was represented by only 3 tasks in total. For this theme, there was no task at the low cognitive demand level, while all 3 tasks were at the high cognitive demand level (HCD1: 2, HCD2: 1). This result suggested that more fundamental level tasks were missing in the Algebraic Thinking with Operations theme. The Statistical Inquiry Process theme was represented by 6 tasks. There was only 1 task at the low cognitive demand level (LCD2), while there were 5 tasks at the high cognitive demand level (HCD1: 1, HCD2: 4). Moreover, Geometric Quantities theme was also particularly concentrated at the high cognitive demand level. There was only 1 task at the low cognitive demand level (LCD2), while there were 4 tasks at the high cognitive demand level (HCD1: 1, HCD2: 3).

In general, the mathematics textbook contained a total of 33 tasks related to financial literacy. Three of these were at the LCD1 level, 8 tasks were at the LCD2 level, 11 tasks were at the HCD1 level, and 11 tasks were at the HCD2 level. This result showed that the tasks are mostly concentrated at higher cognitive demand levels. However, the limited number of tasks at lower cognitive demand levels suggests that additional opportunities could be created to develop foundational financial literacy skills.

Analysis of Learning Tasks based on PISA Financial Literacy and Levels of Cognitive Demands

The analysis of the relationship between the content dimensions of the PISA Financial Literacy Framework and cognitive demand levels indicated that the tasks include both low (LCD1, LCD2) and high (HCD1, HCD2) cognitive demand levels (Table 3).

According to results on the table, the 'Money and Transactions' subcategory had the highest number of tasks. This subcategory included 3 tasks at the LCD1 level, 4 tasks at the LCD2 level, 5 tasks at the HCD1 level, and 4 tasks at the HCD2 level. These findings showed that the textbook included various tasks related to 'money and transactions' at different cognitive levels. In the 'Planning and Managing Finances' subcategory, the tasks were distributed relatively evenly across levels, except for the LCD1 level, which had no task. There were 3 tasks at the LCD2 level, 5 tasks at the HCD1 level, and 4 tasks at the HCD2 level. The 'Risk and Reward' subcategory included a total of 4 tasks. Of these, 1 task was at the LCD2 level, and 3 tasks were at the HCD2 level. The result about absence of task at the LCD1 and HCD1 levels suggests that the subcategory lacks cognitive diversity. The 'Financial Landscape' subcategory was represented by only one task, which was at the HCD1 level.

Table 3 Distribution of Task based on Financial Literacy and Cognitive Demands

Cognitive Demand Level	Subcategories in Content Dimension of PISA Financial Literacy Framework				Total
	MT	P&MF	R&R	FL	
LCD1	3	0	0	0	3
LCD2	4	3	1	0	8
HCD1	5	5	0	1	11
HCD2	4	4	3	0	15
Total	16	12	4	1	33

Overall, a total of 33 different tasks related to financial literacy education were identified in the mathematics textbook. 3 of these tasks were at the LCD1 level, 8 tasks were at the LCD2 level, 11 task were at the HCD1 level, and 11 tasks were at the HCD2 level. It was seen that the tasks were more concentrated on high cognitive demand levels. This result showed that the textbook generally offers more complex and high cognitive level tasks. However, the limited number of tasks at LCD1 level indicated that opportunities for developing basic financial literacy skills can be increased.

Final Reflections on Findings

Based on the overall results of the pairwise analyses of the tasks in the mathematics textbook concerning the themes in the Mathematics Curriculum, cognitive demand levels, and PISA financial literacy content subcategories, it was observed that tasks related to financial literacy education were most frequently found under the Numbers and Quantities theme. In contrast, no tasks in the Geometric Shapes and From Data to Probability themes were associated with financial literacy.

Additionally, tasks of the 'Money and Transactions' type were found to be more prevalent compared to other financial literacy task subcategories. Only one task was identified in the 'Financial Landscape' subcategory. Furthermore, a significant majority of tasks related to financial literacy were observed to be at the High-Level Cognitive Demand level. Tasks at the Low-Level Cognitive Demand level, particularly those involving memorization, were found to be very limited. This situation shows that the tasks in the textbook vary in terms of cognitive demand levels, but basic level tasks were missing in some categories, indicating needs for improvement in providing a balanced range of cognitive demands.

Discussion and Conclusion

The findings of the study indicated that 33 learning tasks in the fifth-grade mathematics textbook (Albayrak et al. 2024a, 2024b) were found related with characteristics of the content domain of the PISA Financial Literacy Framework. According to the findings, the most of the 33 tasks were presented in the 'Numbers and Quantities' theme, and in terms of PISA financial literacy framework, they were mostly related with the 'Money and Transactions' subcategory. The tasks in the 'Numbers and Quantities' theme included fundamental topics such as the arithmetic operations, fractions, decimals, and percentages as mathematics concepts, and these tasks provided contexts about money, calculating with currency, presenting decimal representations of money, and basic financial problems as financial contexts. These characteristics of tasks could provide students opportunity to simultaneously develop both their basic mathematical skills and financial awareness. This approach bridges mathematics education with financial literacy education, creating a meaningful connection between the two fields (Albayrak et al. 2024a, 2024b; Ganem, 2011; MoNE, 2024a). These findings highlight opportunities not only to integrate financial literacy education into mathematics learning environments but also to prepare a solid foundation for connecting mathematics instruction with common financial situations encountered in daily life.

On the other hand, three tasks within the 'Algebraic Thinking with Operations' theme were related with content domain of PISA financial literacy framework. These tasks were found to be related with 'Money and Transactions', and 'Planning and Managing Finances' subcategories. Even there were limited number of tasks with financial context in this theme, this result could indicate the potential to enhance students' abstract thinking and mathematical modelling abilities (Atkinson & Messy, 2012; Blum & Borromeo Ferri, 2009; MoNE, 2024a, 2024b). According to this result, financial literacy education could be supported with learning tasks that not only require arithmetic skills but also incorporate algebraic modeling and problem-solving processes in mathematics lessons.

Moreover, while the 'Geometric Quantities' theme included a total of 5 tasks that could be related to financial literacy, these tasks were also focused on the 'Money and Transactions' and 'Planning and Managing Finances' subcategories. The findings showed that mathematical concepts like measurement and unit conversion could be related with real life financial contexts such as cost calculations or pricing processes in learning tasks. However, the lack of tasks for the 'Risk and Reward' or 'Financial Landscape' subcategory could limit students' capacity to perform geometric reasoning or algebraic reasoning on other dimensions of financial literacy (OECD, 2013).

According to findings, the 'Statistical Inquiry Process' theme involved learning tasks related all subcategories of the financial literacy framework. Since 'Risk and Reward' and 'Financial Landscape' tasks could require statistical data-based context, this result confirmed the potential of giving students opportunity to analyze statistical data to conduct risk assessments and examine data on various financial products to develop predictive understandings (OECD, 2017; Shaughnessy, 2007). On the other hand, the 'Geometric Shapes' and 'From Data to Probability' themes did not involve any task with characteristic of the content dimension of the PISA financial literacy framework. However, integrating probability with financial literacy contexts, such as financial risk analysis, comparing investment options, and long-term planning, could help students

make more reliable and rational decisions about future financial scenarios (Batanero et al., 2016; Jones et al., 2007).

In terms of cognitive demands, these 33 tasks were categorized across a variety in low to high cognitive demand levels. According to results, however, the overall focus was mostly on HCD1 and HCD2. This can be viewed positively, as it allows students to deeply analyze financial concepts and utilize advanced thinking skills such as problem-solving and logical reasoning (Smith & Stein, 1998). Additionally, the 'Numbers and Quantities' theme offers a rich range of examples at both LCD and HCD levels, which is advantageous for helping students develop both basic operational skills and more complex financial problem-solving abilities. The variety of tasks at different levels within this theme contributes to students' gradual internalization of financial contexts (MoNE, 2024a; Smith & Stein, 1998). On the other hand, the association of the 'Algebraic Thinking with Operations' and 'Geometric Quantities' themes primarily with high cognitive demand tasks provides valuable examples of how algebraic and geometric concepts can be integrated with financial situations. This integration has the potential to enhance abstract thinking and mathematical modeling skills (Atkinson & Messy, 2012; Blum & Borromeo Ferri, 2009). However, a limited number of tasks for low-cognitive demand levels might limit opportunities to support financial literacy from foundational levels, particularly in abstract topics such as algebraic thinking (Smith & Stein, 1998). Similarly, the tasks related to financial literacy in the 'Statistical Inquiry Process' theme mostly have characteristics of high cognitive demand levels. This situation could help students model financial decision-making processes based on statistical data inferences. Addressing topics such as risk analysis, data interpretation, and fundamental investment decisions at an introductory level would enable students to build a more robust conceptual foundation (Cole et al., 2016; OECD, 2013).

In conclusion, according to findings,there is a need to design more tasks at lower cognitive demand levels, since low-level financial tasks, such as determining quantities, simple addition-subtraction operations, or basic price calculations, can serve as an essential first step in fostering foundational financial awareness (Fernandes et al., 2014). Furthermore, high-level tasks can enable students to develop a holistic understanding of processes and concepts while enhancing their critical thinking skills (Kaiser & Menkhoff, 2017). Research highlights that supporting financial literacy education with both simple daily life problems and situations requiring advanced analysis contributes to students' ability to make better financial decisions in the future (Fernandes et al., 2014; Kaiser & Menkhoff, 2017). The variety of concepts and levels through which financial literacy education can be linked with mathematics education demonstrates the potential for presenting diverse types of tasks to students.

References

Albayrak, E., Esatoğlu, A., Altunkaynak, A, Yüksal Saray, B., Karasu, İ., Tunç, L., Kavurmacı, M., Bulat, M., Kumru, T., & Korkmaz, Y. N. (2024a). *5th Grade Mathmatics Textbook (volume 1)*. MoNE Publication.

Albayrak, E., Esatoğlu, A., Altunkaynak, A., Yüksal Saray, B., Karasu, İ., Tunç, L., Kavurmacı, M., Bulat, M., Kumru, T. & Korkmaz, Y. N. (2024b). *5th Grade Mathmatics Textbook (volume 2)*. MoNE Publication.

Atkinson, A., & F. Messy. (2012). Measuring financial literacy: Results of the OECD / International Network on Financial Education (INFE) Pilot Study. *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 15, OECD Publishing.

Batanero, C., Chernoff, E. J., Engel, J., Lee, H. S., & Sanchez, E. (2016). *Research on Teaching and Learning Probability*. Springer.

Blum, W., & Borromeo Ferri, R. (2009). Mathematical modelling: Can it be taught and learnt?. *Journal of Mathematical Modelling and Application*, *1*(1), 45-58.

Cole, S., Paulson, A., & Shastry, G. (2016). High school curriculum and financial outcomes: The impact of mandated personal finance and mathematics courses. *The Journal of Human Resources*, *51*(3), 656-698.

Fernandes, D., Lynch, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education,

and downstream financial behaviors. *Management Science*, *60*(8), 1861-1883.

Ganem, J. (2011). Integrating quantitative and financial literacy. *JSM Proceedings*, 1562-1574.

Garg, N., & Singh, S. (2018). Financial literacy among youth. *International Journal of Social Economics*, *45*(1), 173-186.

Hadar, L. (2017). Opportunities to learn: Mathematics textbooks and students' achievements. *Studies in Educational Evaluation*, *55*, 153-166.

Jones, G., Langrall, C., & Mooney, E. (2007). Research in probability: Responding to classroom realities. In F. K. Lester (Ed.), *Second Handbook of Research on Mathematics Teaching and Learning*. Macmillan.

Kaiser, T., & Menkhoff, L. (2017). Does financial education impact financial literacy and financial behavior, and if so, when?. *The World Bank Economic Review*, *31*(3), 611-630.

Krippendorff, K. (2018). *Content Analysis: An Introduction to its Methodology*. Sage Publications.

Lusardi, A. (2006). Financial literacy and financial education: Review and policy implications. *Networks Financial Institute Policy Brief, 2006-PB-11*.

Mayring, P. (2015). Qualitative content analysis: Theoretical background and procedures. In A. Bikner-Ahsbahs, C. Knipping, & N. Presmeg (Eds.), *Approaches to Qualitative Research in Mathematics Education: Examples of Methodology and Methods* (pp. 365-380). Springer.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook*. Sage.

MoNE. (2018). *Middle School Mathematics Curriculum (Grades 5, 6, 7, and 8)*. Ministry of National Education.

MoNE. (2024a). *Middle School Mathematics Curriculum (Grades 5, 6, 7, and 8)*. Ministry of National Education.

MoNE. (2024b). *The Century of Turkey Education Model Education Programs Common Text*. Ministry of National Education.

Muñoz-Murillo, M., Álvarez-Franco, P. B., & Restrepo-Tobón, D. A. (2020). The role of cognitive abilities on financial literacy: New experimental evidence. *Journal of Behavioral and Experimental Economics*, *84*.

OECD. (2009). *Financial Literacy and Consumer Protection: Overlooked Aspects of the Crisis*. OECD Publishing.

OECD. (2013). *PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy*. OECD Publishing.

OECD. (2014). *PISA 2012 Results: Students and Money (Volume VI) Financial Literacy Skills for the 21st Century*. OECD Publishing.

OECD. (2023). *PISA 2022 Assessment and Analytical Framework*. OECD Publishing.

OECD. (2017). *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic, Financial Literacy and Collaborative Problem Solving*. OECD Publishing.

Pang, M. (2010). Boosting financial literacy: Benefits from learning study. *Instructional Science*, *38*, 659-677.

Paolacci, G., & Legrenzi, E. P. (2012). Financial literacy and cognitive abilities: An empirical study. *Italian Journal of Psychology*, *39*(3), 707-716.

Pesando, L. M. (2018). Does financial literacy increase students' perceived value of schooling?. *Education Economics*, *26*(5), 488-515.

Roa, M. J., Garrón, I., & Barboza, J. (2018). The role of cognitive characteristics, personality traits, and financial literacy in financial decision making. In M. Jose & D. Mejia (Eds.), *Financial Decisions of Households and Financial Inclusion: Evidence for Latin America and the Caribbean* (pp. 193-244). Center for Latin American Monetary Studies.

Saini, N. S., & Roslinda, R. (2021). Financial elements in teaching and learning of mathematics: A systematic review. *International Research in Education*, *9*(1), 1-18.

Shaughnessy, J. M. (2007). Research on statistics learning and reasoning. In F. K. Lester (Ed.), *Second Handbook of Research on*

Mathematics Teaching and Learning (pp. 957-1009). Information Age Publishing.

Smith, M. S., & Stein, M. K. (1998). Reflections on Practice: Selecting and creating mathematical tasks: From research to practice. *Mathematics Teaching in the Middle School*, *3*(5), 344-350.

Stein, M. K., Grover, B. W., & Henningsen, M. (1996). Building student capacity for mathematical thinking and reasoning: An analysis of mathematical tasks used in reform classrooms. *American Educational Research Journal*, *33*(2), 455-488.

Stillman, G. (1996). Mathematical processing and cognitive demand in problem solving. *Mathematics Education Research Journal*, *8*, 174-197.

Author Details

Bilal Özçakir, *Alanya Alaadin Keykubat University, Turkey,* ***Email ID****: bilal.ozcakir@alanya.edu.tr*