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Insights from a Teaching Assistance Program in Thailand: A Scientific Literacy Analysis of a Lower Secondary Science Textbook

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Abstract
This study was conducted in response to the growing importance of scientific literacy as a key competence for students in the 21st century, particularly in relation to global challenges and evidence-based decision making. The research aims to analyze the presentation of scientific literacy in the Science and Technology textbook for Mattayom 3, Semester 2, used at Ban Kayae School, Narathiwat, Thailand, and to describe its strengths and limitations in relation to the OECD scientific literacy framework. A qualitative approach with content analysis design was employed. The unit of analysis included all chapters, learning activities, illustrations, and evaluation tasks in the textbook. Data were collected through documentation, checklist sheets based on three OECD competencies, and semi-structured interviews with two expert validators. Data were analyzed through coding, percentage calculation, and inter-rater agreement using Cohen's Kappa. The results indicate that the textbook integrates the three core competencies of scientific literacy: explaining phenomena scientifically (35.1%), evaluating and designing scientific inquiry (32.4%), and interpreting data and evidence for decision-making (32.2%), with a relatively balanced distribution across chapters. Although certain chapters emphasize particular competencies, the book does not solely focus on conceptual knowledge but also incorporates inquiry and application aspects. The textbook is structurally aligned with OECD indicators and is considered worthy as a model for literacy-oriented science textbooks. Future development should strengthen authentic inquiry activities, contextual data analysis, and visual clarity to further enhance scientific literacy integration.

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INTRODUCTION

Global developments in the 21st century have positioned scientific literacy as a key competency in equipping young people to deal with the complexities of the modern world. Social transformations triggered by technological advances, climate change issues, health crises, and knowledge-based economic development require individuals to be able to critically understand scientific information and make evidence-based decisions (Sapriani, 2019). Therefore, science education should no longer be oriented towards mastering concepts, but must develop scientific thinking skills, data-based reasoning, and awareness of the social implications of science and technology.

In line with these demands, science education is directed towards the development of scientific literacy as an essential competency for modern citizens. Scientific literacy enables students to understand natural phenomena rationally, evaluate evidence-based information, and make responsible decisions in their daily lives. Science learning that emphasizes the scientific approach encourages students to actively observe, question, reason, and communicate their findings systematically(Irhasyuarna et al., 2022). Thus, science literacy becomes the foundation for shaping a generation that is critical, adaptive, and responsive to global issues such as climate change, health, energy, and technological developments(Kelp et al., 2023). Science textbooks for junior high schools in Indonesia focus more on understanding scientific concepts, while other categories, such as scientific inquiry, scientific thinking, and the relationship between science, technology, and society, still receive less attention(Budiningsih et al., 2015).

Conceptually, science literacy is defined by the OECD through the Programme for International Student Assessment (PISA)(Sholikah & Pertiwi, 2021)framework as an individual's ability to engage with science-related issues and use scientific ideas as a reflective citizen. This framework encompasses three key competencies, namely: (1) Explaining phenomena scientifically; (2) Constructing and evaluating designs to investigate and interpret scientific data and evidence critically; (3) Investigating and evaluating using scientific information to make decisions and take action(Afina et al., 2021). These three competencies emphasize that science learning must integrate conceptual understanding with process skills and scientific reasoning so that students are able to apply science in real-world contexts, rather than simply memorizing facts.

The participation of various countries in PISA shows that science literacy has become a global indicator of education quality. In Southeast Asia, Thailand and Indonesia are participating countries that still face challenges in achieving science literacy. The 2018 PISA results placed Thailand 55th and Indonesia 70th out of 79 participating countries, with both countries' achievements below the OECD average(El Islami & Nuangchalerm, 2020). These results indicate problems in both structural and pedagogical aspects, including learning practices that do not fully encourage scientific thinking skills and the use of teaching materials that are not optimally integrated with science literacy indicators.

In this context, textbooks play a strategic role as the main source of learning and as pedagogical instruments that shape students' thinking. Textbooks designed based on science literacy should present contextual phenomena, investigative activities, data interpretation, and the interrelationships between science, technology, and society. This type of presentation has been proven to be more effective in fostering scientific competence in students(Ayyoub et al., 2025). Thus, the quality of textbooks is one of the determining factors in improving science literacy.

The urgency of analyzing textbooks is even greater, considering that a number of studies have shown an imbalance in science literacy content. Studies in Indonesia have found that science textbooks tend to emphasize conceptual knowledge rather than scientific inquiry, critical thinking, and the integration of science with technology and society(Agustin & Supahar, 2021b). This imbalance has the potential to hinder the development of science literacy as a whole, according to the OECD framework. Therefore, a systematic analysis is needed to map the proportion and characteristics of science literacy presentation in textbooks.

This study stems from the author's experience participating in a teaching assistant program (ASJAR) at Mattayom Ban Kayae School, Narathiwat Province, Southern Thailand. This school is located in a unique socio-cultural and linguistic context, with Thai and Malay being used in daily interactions. The Grade 3 Semester 2 science textbook (equivalent to Grade 9 junior high school) used at the school became the object of study because it represents the implementation of the national curriculum in a multilingual local context. This condition provides an opportunity to examine how science literacy is integrated into textbooks in educational environments with different cultural characteristics. This study is expected to provide comprehensive information on the strengths and weaknesses of science literacy presentation in the book,

as well as contribute to efforts to improve the quality of science education, both in Thailand and in the development of textbooks in Indonesia(Sudarsono et al., 2020).

Although research on science literacy in textbooks has been widely conducted in Indonesia, studies on science textbooks in Thailand, especially in Southern Thailand, are still relatively limited. Most previous studies have focused on textbooks based on the Indonesian national curriculum. Therefore, this study is novel in that it analyzes the science literacy content of science textbooks used in Ban Kayae, Narathiwat, based on the OECD science literacy framework.

Based on this background, this study aims to (1) analyze the presentation of science literacy aspects in the Mattayom 3 semester 2 science textbook used at Ban Kayae School, Narathiwat, Thailand, and (2) describe the strengths and weaknesses of its presentation based on science literacy indicators according to the OECD framework. The results of this study are expected to provide a comprehensive overview of the proportion, depth, and balance of science literacy content in the textbook, as well as serve as a basis for recommendations for the development of more systematic, contextual, and internationally aligned science textbooks.

METHODS

This study uses a qualitative approach with a content analysis design to examine the science literacy content in science textbooks. Content analysis was chosen because it allows for the systematic identification, classification, and interpretation of text content based on theoretical indicators(Firmansyah et al., 2021). The analysis framework refers to the dimensions of science literacy developed by the Organisation for Economic Co-operation and Development through the Programme for International Student Assessment (PISA), which includes three main competencies: (C1) Explaining phenomena scientifically; (C2) Constructing and evaluating designs to investigate and interpret scientific data and evidence critically; (C3) Researching and evaluating using scientific information to make decisions and take action (source).

The analysis of the *Science and Technology Mathayom 3 Semester 2* textbook used at Ban Kayae School, Narathiwat, Thailand, was conducted based on the OECD scientific literacy framework, which includes three core competencies: explaining scientific phenomena (C1), evaluating and designing scientific inquiry (C2), and interpreting data and evidence for decision-making (C3). The units of analysis covered textual explanations, illustrations, student activities, and assessment tasks presented across four chapters.

The object of this study is the Science and Technology Mathayom 3 Semester 2 textbook (ISBN 978-616-203-952-2) published by Aksorn Charoentat Co., Ltd., Bangkok, in 2017 and used nationally in Thailand. This book is equivalent to the ninth grade of junior high school in Indonesia. The book was selected based on preliminary studies conducted while the researcher was participating in the Teaching Assistant (Asjar) program at Mattayom Ban Kayae School in Narathiwat Province, Southern Thailand.

For analytical purposes, the entire contents of the book were translated into Indonesian to facilitate the process of coding and interpreting the data. All chapters in the book were analyzed as units of analysis, with the units of recording including material statements, learning activities, practice questions, illustrations, tables, pictures, and various other representations containing science literacy indicators.

Data collection was conducted through documentation, checklist sheets, and semi-structured interviews. Documentation focused on a systematic review of the book's content. The checklist was compiled based on the OECD science literacy indicators and was used to identify the appearance of each competency in each chapter(Darmawati et al., 2025). Semi-structured interviews were conducted with two experts, namely science education lecturers, to obtain conceptual validation of the interpretation of indicators and to reinforce the accuracy of categorization.

The data analysis procedure included data reduction, data presentation, and conclusion drawing. In the reduction stage, all book content was coded based on the three science literacy competencies according to the OECD. Each indicator that appeared was recorded and classified per chapter. To ensure validity, two experts assessed each item with a "yes" or "no" category using a checklist. The level of agreement was analyzed using the Kappa coefficient(Pujiyanti et al., 2022). Based on Fleiss (1975), $k < 0.40$ is categorized as poor agreement, $0.40 \leq k < 0.75$ as good agreement, and $k \geq 0.75$ as excellent agreement(Palupi & Rosana, 2018).

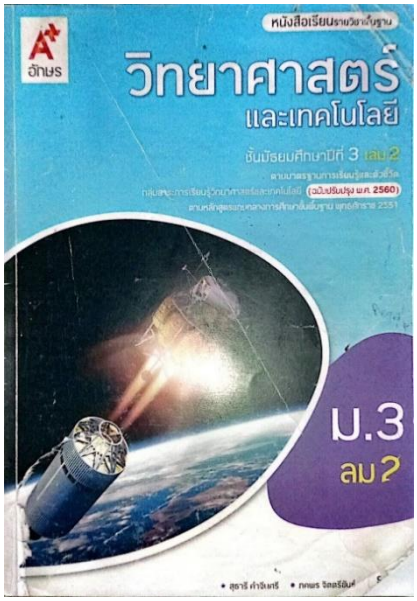


Figure 1. Science books that are the subject of research

At the data presentation stage, the frequency of occurrence of each science literacy indicator was calculated and summarized in a distribution table to obtain a proportional overview of the indicators. The percentage of occurrence of each indicator was calculated using the formula $p = (\sum x/n) \times 100\%$, where p represents the percentage of indicator occurrence, $\sum x$ is the number of occurrences of a particular indicator, and n is the total number of analysis units in the book(Fayanto et al., 2023).

RESULTS AND DISCUSSION

The results of the analysis of the Science and Technology Mathayom 3 Semester 2 student book used at Ban Kayae School, Narathiwat, Thailand, were assessed based on science literacy indicators according to the OECD framework. The sources of data for the analysis included learning materials, illustrations, student activities, practical activities, and the forms of evaluation presented in the book. Structurally, the Science and Technology Mattayom 3 Semester 2 textbook consists of four chapters, all of which were analyzed as units of study in this research.

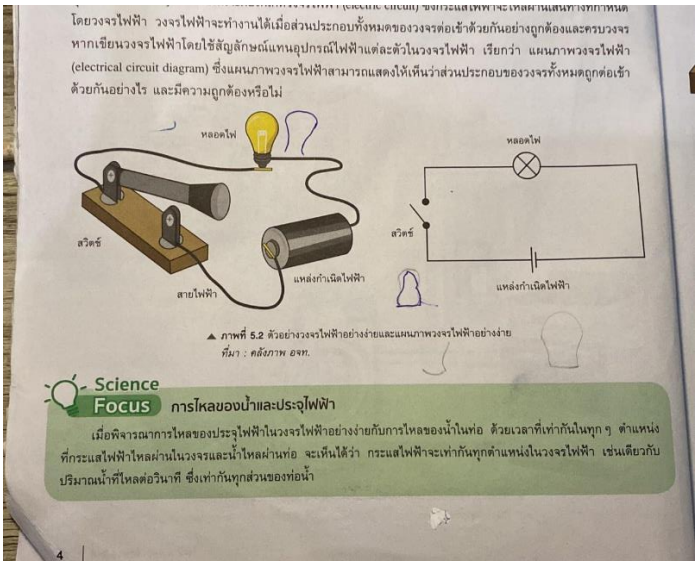
Chapter I discusses Electricity and Electronics, which covers three subsections, namely basic electrical circuits, basic electronic circuits, and electrical energy and household appliances. Chapter II discusses Waves with two subsections, namely wave components and electromagnetic waves. Chapter III discusses Light and Vision, which consists of five subsections, covering light reflection, light refraction, phenomena related to light, visual equipment, and the eye and vision. Chapter IV discusses Interactions in the Solar System and Space Technology, which includes two subsections, namely interactions in the solar system and space technology.

The analysis results show that there are 37 items that are the sources of research data and are spread across four chapters. The distribution of the number of items in each chapter is presented in detail in Table 1.

Several examples of science literacy items in Chapter I, Electricity and Electronics, are shown in Figure 2. Figure 2(a) represents the indicator of explaining phenomena scientifically (C1). Figure 2(b) shows the indicator of designing and evaluating scientific investigations and interpreting data and evidence critically (C2). Meanwhile, Figure 2(c) illustrates the indicator of evaluating and using scientific information for decision-making and action (C3). Examples of items in other chapters, along with the mapping of science literacy indicators, are presented in a separate appendix to this article.

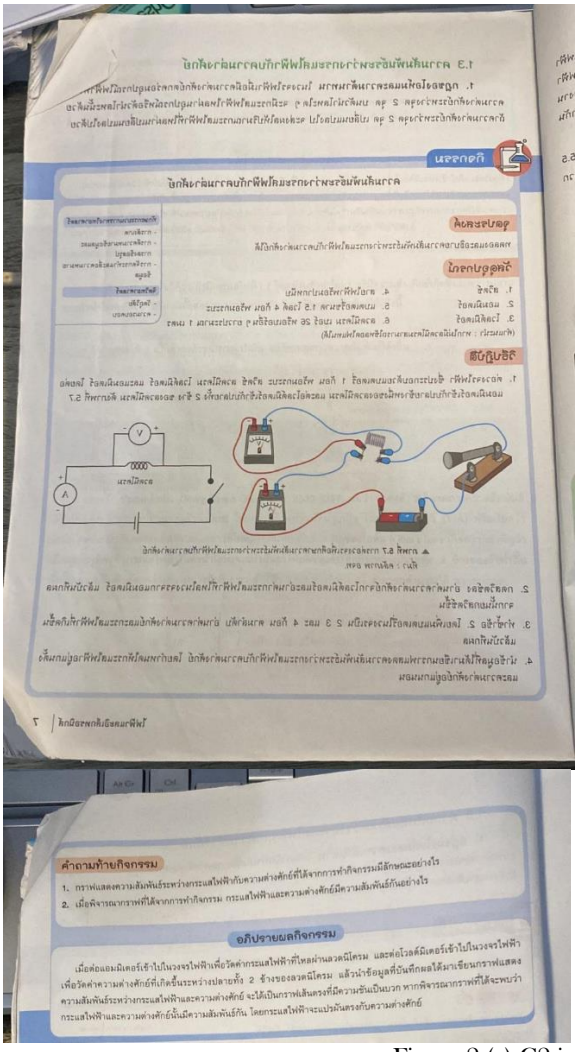
Table 1. Distribution of science literacy items in each chapter

No.	Science literacy indicators	Chapter 1 Electricity and electronics	Chapter 2 Waves	Chapter 3 Light and vision	Chapter 4 Interactions in the solar system and space technology	Σ
C1	Explaining phenomena scientifically	5	4	3	1	13
C2	Developing and evaluating designs to investigate and interpret scientific data and evidence critically	4	1	4	3	12
C3	Researching, evaluating, and using scientific information to make decisions and take action	3	1	6	2	12
	Number	12	6	13	6	37



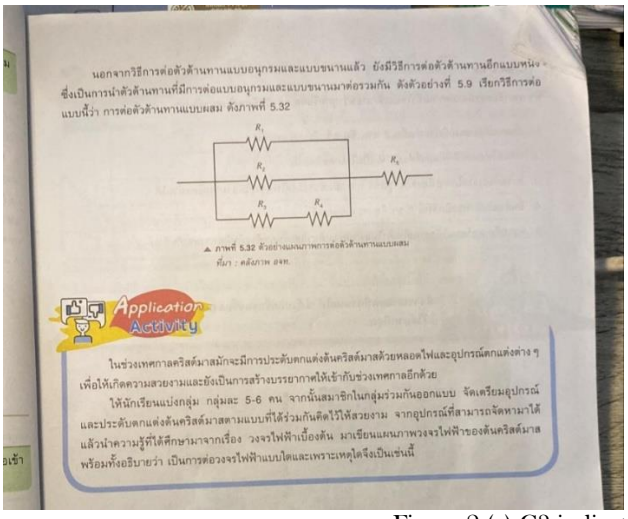
Translation: When observed, the flow of electric charge in a simple electrical circuit can be analogized to the flow of water in a pipe. At the same time interval, electric charge flows through every point in the circuit just as water flows through every part of the pipe. Thus, the electric current at every point in a series circuit has the same value, just as the amount of water flowing every second remains the same throughout the pipe. This analogy helps explain that electric current does not "run out" in the middle of the circuit, but flows continuously in a closed system.

Figure 2 (a) C1 indicator in Chapter 1



At the end of the activity, two reflective questions were presented as follows: (1) What is the shape of the graph showing the relationship between electric current and potential difference based on the experimental results? (2) Based on the graph, what is the relationship between electric current and potential difference? Based on the results of the activity, when an ammeter was installed in the circuit to measure the current and a voltmeter was used to measure the potential difference at both ends of the nichrome wire, the data obtained was then presented in the form of a graph showing the relationship between current (I) and potential difference (V). The resulting graph is a straight line with a positive slope, which shows that electric current is directly proportional to potential difference. This means that the greater the potential difference applied, the greater the current that flows, in accordance with Ohm's Law.

Figure 2 (c) C2 indicator in Chapter 1



Translation: At Christmas, Christmas trees are often decorated with lights and various ornaments to make them look beautiful and create a festive atmosphere. Ask students to divide themselves into groups of 5-6 people, then group members work together to design, prepare equipment, and decorate the Christmas tree according to the design they have thought of together to beautify it with the available equipment. Then, use the knowledge they have learned from the basic electrical circuit lesson to draw a diagram of the Christmas tree's electrical circuit and explain the type of electrical circuit and why it is shaped that way.

Figure 2 (c) C3 indicator in Chapter 1

Based on the checklist agreement, expert 1 rated “yes” for 37 items or all science literacy items, while expert 2 rated “yes” for 33 science literacy items. There were only 4 items on which “No” expert 1 and expert 2 disagreed.

Table 2 Cross-tabulation of the Two Experts' Assessments and Kappa Coefficient Values for Science Literacy Items

		Expert 2		Total
		Yes	No	
expert 1	Yes	33	4	37
	No	0	0	0
Total		33	4	37
Observed Agreement		89,2%		
Koefisien Kappa	0 (*poor agreement*)			

Although the level of absolute agreement among experts was relatively high, the Kappa coefficient showed a value of 0, which falls into the poor agreement category, meaning that statistically, agreement was low after controlling for chance. This condition was influenced by the dominance of the "yes" category in almost all items, so that the probability of random agreement was high and the difference between actual agreement and agreement due to chance was very small. Substantively, these findings indicate that most items in the book are considered by both experts to contain science literacy indicators, with relatively small variations in assessment and differences only on a few items. These differences are likely due to operational ambiguity at the boundaries between indicators (C1, C2, and C3). Thus, the low Kappa value does not necessarily indicate that the instrument is unreliable, but rather that it is influenced by an unbalanced category distribution.

The results of the expert interviews reinforce the qualitative findings that the textbooks comprehensively cover all three aspects of science literacy and present them in the form of practical activities, data-based discussions, and evaluative exercises.

Meanwhile, the distribution of the percentage of science literacy indicators in each chapter is presented in Table 3. The results of the analysis of the distribution of science literacy competencies in the textbooks studied, based on the three main competencies according to the OECD framework, are presented in Table 4.

Table 3. Distribution of the percentage of science literacy indicators in each chapter

Chapter	Science literacy indicators	Percentage
Chapter 1 Electricity and Electronics	C1	41,6%
	C2	33,3%
	C3	25,0%
Chapter 2 Waves	C1	66,6%
	C2	16,6%
	C3	16,6%
Chapter 3 Light and Vision	C1	25,0%
	C2	25,0%
	C3	50,0%
Chapter 4 Interactions in the Solar System and Space Technology	C1	16,6%
	C2	50,0%
	C3	33,3%

Table 4 Percentage Distribution of Science Literacy Competencies (K1, K2, and K3) in Mathayom 3 Semester 2 Science and Technology Books

Science literacy indicators	Percentage
C1. Explain phenomena scientifically.	35,1%
C2. Develop and evaluate designs to investigate and interpret scientific data and evidence critically.	32,4%
C3. Research and evaluate using scientific information to make decisions and take action.	32,2%

From a theoretical perspective, the balanced integration of these competencies aligns with constructivist learning theory, which emphasizes the importance of engaging students in active knowledge construction through inquiry, reasoning, and real-world application. The presence of practical activities, data interpretation tasks, and contextual problem-solving exercises in the textbook supports the development of higher-order thinking skills, which are essential components of scientific literacy.

Furthermore, while numerous studies have examined science textbooks in Indonesia, empirical research focusing on science textbooks used in Thailand—particularly in multicultural and multilingual contexts such as Southern Thailand—is still very limited. This gap highlights the need for a systematic analysis of how scientific literacy is represented in textbooks within different educational and socio-cultural settings.

Therefore, this study aims to fill this gap by analyzing the presentation of scientific literacy in a Thai lower secondary science textbook using the OECD framework. In addition, this study also seeks to identify the strengths and limitations of the textbook in supporting the development of students' scientific literacy.

Based on Table 3, the emergence of science literacy indicators shows variations in competency emphasis in each chapter. Chapter 2 (Waves) is dominated by competency C1 (66.6%), which emphasizes the ability to explain phenomena scientifically, in line with the nature of the material, which focuses on strengthening basic concepts. Chapter 1 (Electricity and Electronics) shows a relatively more balanced distribution between C1 (41.6%) and C2 (33.3%), indicating a combination of conceptual understanding and data analysis or circuit activities. Chapter 3 (Light and Vision) is dominated by C3 (50.0%), indicating an emphasis on the use of scientific information for interpreting phenomena and decision-making. Meanwhile, Chapter 4 (Interactions in the Solar System and Space Technology) highlights C2 (50.0%), reflecting greater opportunities for students to evaluate investigation designs and interpret scientific evidence. These variations show that each chapter develops different dimensions of science literacy according to the characteristics of its content.

Overall (Table 4), the distribution of science literacy competencies in textbooks is relatively balanced, with C1 at 35.1%, C2 at 32.4%, and C3 at 32.2%. These findings indicate that the textbooks have accommodated the three main science literacy competencies according to the OECD, namely explaining scientific phenomena, designing and evaluating investigations, and using scientific evidence for decision making. The dominance of C1, which is not too far from C2 and C3, indicates that the conceptual approach is still the main foundation, but it has been balanced with the dimensions of scientific processes and applications(Akmam et al., 2025).

The main strength of these textbooks lies in the systematic and logical presentation of material, which makes it easier for students to understand the interrelationships between concepts. The structured arrangement and integration of concepts is known to contribute to the quality of student learning, as confirmed in various studies(Vojíř & Rusek, 2019). This book also integrates practical activities that encourage the testing of concepts through direct experience, and presents learning activities that are integrated with evaluation so that the learning process takes place continuously between understanding and measuring achievement. Substantively, this book contains the three science literacy competencies in accordance with the OECD framework.

However, a deeper analysis reveals several limitations. First, despite the overall balance, certain chapters still show dominance of specific competencies, particularly conceptual understanding (C1). This indicates that the textbook design may still prioritize knowledge acquisition over inquiry and critical evaluation in specific contexts. Such an imbalance has the potential to limit students' opportunities to fully develop investigative and reasoning skills.

Second, the quality of inquiry presented in the textbook tends to be guided rather than open-ended. Most activities provide structured procedures, which may reduce opportunities for students to independently design investigations or formulate hypotheses. This finding is consistent with previous

research indicating that science textbooks often emphasize guided inquiry rather than authentic inquiry practices.

Third, visual representations in several sections are not optimally designed to support conceptual understanding. Although visuals are present, their clarity and integration with the text are sometimes limited, particularly due to translation constraints. Given that visual elements play a critical role in supporting scientific reasoning, this aspect requires further improvement.

On the other hand, there are several aspects that need attention. The distribution of science literacy competencies in several chapters is not entirely proportional, so that the emphasis on certain competencies is more dominant than others. In addition, the visual quality of some illustrations is considered suboptimal, which in the context of this study is also influenced by the translation process, potentially affecting the clarity of concept representation. In some materials, the relatively strong emphasis on conceptual aspects also has the potential to limit the scope for more in-depth investigative exploration.

In general, the findings of this textbook have accommodated the three PISA/OECD science literacy competencies(Fortus et al., 2022) (explaining phenomena, designing/evaluating investigations, and interpreting evidence for decision-making) With a relatively balanced distribution (C1–C3 around 30 percent) is actually more progressive than many textbook analysis studies, which tend to find a strong dominance of knowledge/conceptual aspects and a relative weakness in scientific process and application context aspects. An analysis of 11th-grade chemistry textbooks in Surakarta, for example, shows that the portion of "science as knowledge" is close to 70%, while "science as a way of investigation" is only about 14%, "science as a way of thinking" is 10%, and science-technology-society interactions are less than 5%(Pertiwi et al., 2022). Similarly, an analysis of junior high school science textbooks for the 2013 curriculum in West Jakarta found that "knowledge of science" dominated more than 70% of the content, with a low proportion devoted to investigative and socio-scientific dimensions (Fakhri & Herlanti, 2025). International studies of textbook activities also report that the activities presented generally still focus on basic cognitive skills (remembering, identifying characteristics) and rarely encourage inquiry skills, data utilization, or evidence-based argumentation (Garcia Barros et al., 2021).

Thus, this textbook is known to contain all three science literacy competencies and provide integrated practical work and evaluation activities in line with the direction of current science literacy development, while also filling the gaps that have been widely identified in other books. However, notes about the continued dominance of conceptual emphasis in certain chapters, limited investigative opportunities, and suboptimal visual quality are also consistent with the literature: various studies show that science books often lack space for authentic inquiry, critical interpretation, and maximum use of visual representations. So it is recommended that there be a shift from simply delivering content to more diverse, challenging, and contextual activities to truly strengthen science literacy(Alam et al., 2022; Devetak & Vogrinc, 2013; Guo et al., 2018; Kepceoğlu & Pektaş, 2023).

CONCLUSION

These results contribute to the broader discourse on science textbook development by demonstrating that balanced integration of scientific literacy is achievable, even within structured curriculum frameworks. At the same time, they highlight the need for continuous refinement to ensure that scientific literacy is not only present in structure but also meaningful in practice.

This study aims to analyze the presentation of science literacy aspects in the Mathayom 3 Semester 2 Science and Technology textbook and describe its strengths and weaknesses based on the OECD science literacy framework. The results of the analysis show that the book accommodates the three main science literacy competencies—explaining phenomena scientifically (C1), designing and evaluating investigations (C2), and using scientific evidence for decision-making (C3)—with a relatively balanced distribution (35.1%; 32.4%; 32.2%). Although

there are variations in emphasis in each chapter, overall, the book is not only oriented towards mastery of concepts but also includes aspects of scientific processes and applications. These findings indicate that the textbook is structurally aligned with the OECD science literacy indicators and can be used as an example in the development of textbooks oriented towards strengthening science literacy, even though the integration of competencies in some chapters is not yet fully proportional and consistent.

Based on these findings, future textbook development needs to be directed towards a more systematic and balanced integration of conceptual, investigative, and applied competencies in each chapter. Authentic investigative activities, context-based data analysis, and the strengthening of evidence-based scientific argumentation need to be expanded in order to optimize the depth of science literacy. In addition, improving the quality of visual representations and the clarity of illustrations—especially in the context of cross-language translation—needs to be a focus in order to support the analysis process, particularly for similar research. Further research is also recommended to examine the implementation of this textbook in classroom learning practices to see the extent to which science literacy content is truly internalized in students' learning experiences.

REFERENCES

Afina, D. R., Hayati, M. N., & Fatkhurrohman, M. A. (2021). Profil Capaian Kompetensi Literasi Sains Siswa Smp Negeri Kota Tegal Menggunakan Pisa. *Psej (Pancasakti Science Education Journal)*, *6*(1), 10–21. Https://Doi.Org/10.24905/Psej.V6i1.111

Agustin, A. R., & Supahar. (2021). *A Quantitative Analysis Of Indonesian Junior High School Science Textbooks For Scientific Literacy Themes*. 752–761. Https://Doi.Org/10.2991/Assehr.K.210326.108

Akmam, A., Ahzari, S., Emiliannur, E., Anshari, R., & Setiawan, D. (2025). Enhancing Science Literacy Through Cognitive Conflict-Based Generative Learning Model: An Experimental Study In Physics Learning. *Social Science And Humanities Journal*, *9*(07), 8507–8522. Https://Doi.Org/10.18535/Sshj.V9i07.1934

Alam, M. F., Uzair, M., & Arshad, U. (2022). Unfolding Graphic Representation In Science Textbooks At Intermediate Level: A Narratological Appraisal. *Pakistan Social Sciences Review*, *6*(2), 918–928.

Ayyoub, A., Jabali, O., Daraghmih, F., & Jabali, S. (2025). Assessing Courseware: Insights From Medical Students On Textbook Efficacy In Palestinian Medical Contexts. *Journal Of Medical Education And Curricular Development*, *12*, 23821205251342099. Https://Doi.Org/10.1177/23821205251342099

Budiningsih, T. Y., Rusilowati, A., & Marwoto, P. (2015). Pengembangan Buku Ajar Ipa Terpadu Berorientasi Literasi Sains Materi Energi Dan Suhu. *Journal Of Innovative Science Education*, *4*(2). Https://Journal.Unnes.Ac.Id/Journals

Darmawati, V. D., Wulandari, A. Y. R., Putra, D. B. R. A., & Sulastri, E. (2025). Validitas Instrumen Soal Literasi Sains Pada Konteks Batik Madura Materi Unsur, Senyawa, Dan Campuran. *Jurnal Pendidikan Mipa*, *15*(1), 173–183. Https://Doi.Org/10.37630/Jpm.V15i1.2284

Devetak, I., & Vogrinc, J. (2013). The Criteria For Evaluating The Quality Of The Science Textbooks. In M. S. Khine (Ed.), *Critical Analysis Of Science Textbooks* (Pp. 3–15). Springer Netherlands. Https://Doi.Org/10.1007/978-94-007-4168-3_1

El Islami, R. A. Z., & Nuangchalerm, P. (2020). Comparative Study Of Scientific Literacy: Indonesian And Thai Pre-Service Science Teachers Report. *International Journal Of Evaluation And Research In Education*, *9*(2), 261–268.

Fakhri, F., & Herlanti, Y. (2025). Analysis Of Science Literacy In Science Textbooks For Junior High School Based On The Revised 2013 Curriculum In West Jakarta. *Jurnal Pendidikan Matematika Dan Ipa*, *16*(2), 310–323.

Fayanto, S., Sulthoni, Wedi, A., Takda, A., & Fadilah, M. (2023). Exploration Of Integrated Science-Physics Textbooks Based On Science Literacy Indicators: A Case Study In Kendari City Indonesia. *Anatolian Journal Of Education*, *8*(1), 159–172.

Firmansyah, M., Masrun, M., & S, I. D. K. Y. (2021). Esensi Perbedaan Metode Kualitatif Dan Kuantitatif. *Elastisitas : Jurnal Ekonomi Pembangunan*, *3*(2), 156–159.

Fortus, D., Lin, J., Neumann, K., & Sadler, T. D. (2022). The Role Of Affect In Science Literacy For All. *International Journal Of Science Education*, *44*(4), 535–555. Https://Doi.Org/10.1080/09500693.2022.2036384

Garcia Barros, S., Martinez Lossada, C., & Rivadulla Lopez, J. (2021). Textbook Activities. Their Contribution To The Development Of The Scientific Literacy. *Enseñanza De Las Ciencias*, *39*(1), 219–238.

Guo, D., Wright, K. L., & Mctigue, E. M. (2018). A Content Analysis Of Visuals In Elementary School Textbooks. *The Elementary School Journal*, *119*(2), 244–269. Https://Doi.Org/10.1086/700266

Irhasyuarna, Y., Kusasi, M., Fahmi, F., Fajeriadi, H., Aulia, W. R., Nikmah, S., & Rahili, Z. (2022). Integrated Science Teaching Materials With Local Wisdom Insights To Improve Students' Critical Thinking Ability. *Bio-Inoved : Jurnal Biologi-Inovasi Pendidikan*, *4*(3), 328–334. Https://Doi.Org/10.20527/Bino.V4i3.14148

Kelp, N. C., Mccartney, M., Sarvary, M. A., Shaffer, J. F., & Wolyniak, M. J. (2023). Developing Science Literacy In Students And Society: Theory, Research, And Practice. *Journal Of Microbiology & Biology Education*, *24*(2), E00058-23. Https://Doi.Org/10.1128/Jmbe.00058-23

Kepceoğlu, G. Z., & Pektaş, M. (2023). Examination Of Visual Items In Secondary School Science Textbooks. *Journal Of Social Sciences And Education*, *6*(Education Special Issue), 264–278.

Palupi, A. F., & Rosana, D. (2018). Analisis Kesesuaian Buku Siswa Mata Pelajaran Ilmu Pengetahuan Alam Smp Kurikulum 2013 Kelas Vii Ditinjau Dari Standar Proses Dan Penilaian Autentik. *Jurnal Tpack Ipa*, *7*(7), 373–378.

Pertiwi, N. P., Nurhayati, N. D., & Saputro, S. (2022). Analysis Of Science Literacy Teaching Book Class Xi At Sma Negeri Surakarta On Acid-Base Material. *Thabiea: Journal Of Natural Science Teaching*, *5*(1), 17–33.

Pujiyanti, R., Hernawati, D., & Diella, D. (2022). Analisis Komponen Literasi Sains Pada Buku Teks Biologi Kelas Xi. *Diklabio: Jurnal Pendidikan Dan Pembelajaran Biologi*, 126–135. Https://Doi.Org/10.33369/Diklabio.6.2.126-135

Sapriani, R. (2019). Profesionalisme Guru Paud Melati Terpadu Dalam Meningkatkan Mutu Pendidikan Pada Era Revolusi Industri 4.0. *Prosiding Seminar Nasional Program Pascasarjana Universitas Pgri Palembang*. Https://Journal.Univpgri-Palembang.Ac.Id/Index.Php/Prosidingpps/Article/View/2631

Sholikah, L., & Pertiwi, F. N. (2021). Analysis Of Science Literacy Ability Of Junior High School Students Based On Programme For International Student Assessement (Pisa). *Insecta: Integrative Science Education And Teaching Activity Journal*, *2*(1), 95–104. Https://Doi.Org/10.21154/Insecta.V2i1.2922

Sudarsono, S., Abdurrahman, A., & Rosidin, U. (2020). Pengembangan Cerita Bergambar Fisika Berbasis Stem Untuk Menumbuhkan Literasi Sains Pada Siswa Smp. *Jurnal Pendidikan Fisika Fkip Um Metro*, *8*(1), 11–23. Https://Doi.Org/10.24127/Jpf.V8i1.2202

Vojíř, K., & Rusek, M. (2019). Science Education Textbook Research Trends: A Systematic Literature Review. *International Journal Of Science Education*, *41*(11), 1496–1516. Https://Doi.Org/10.1080/09500693.2019.1613584