VENN: Journal of Sustainable Innovation on Education, Mathematics and Natural Sciences
ISSN: 2964-867X
Journal Homepage: https://pustaka.my.id/journals/venn/index

Exploring Undergraduate Mathematics Students' Understanding of Realistic Mathematics Education

Intan Buhati Asfyra[1], Nur Ismiyati[2]
Jurusan Matematika, Fakultas Matematika dan Ilmu Pengetahuan Alam, Universitas Negeri Makssar, Makssar, Indonesia,

intan.buhati@unm.ac.id[1], *nur.ismiyati@unm.ac.id*[2]

Corresponding Author: Intan Buhati Asfyra, E-mail: intan.buhati@unm.ac.id

Article Information
Received : 19 September 2026
Reviced : 30 Oktober 2026
Accepted : 13 November 2026
Published : 13 November 2026

ABSTRACT
Realistic Mathematics Education (RME) emphasizes meaningful learning through contexts, students' strategies, models, and mathematization. However, recognizing RME characteristics does not necessarily mean understanding how these components are connected in the learning process. This understanding is important for undergraduate mathematics education students as prospective mathematics teachers. This study explored their understanding of RME through a descriptive qualitative approach involving 41 fifth-semester students. Data were collected using eight essay test questions and follow-up interviews. The data were analyzed through coding, categorization, and identification of patterns and variations in students' responses. The findings indicate that students generally recognized RME as an approach emphasizing contextual learning, student activity, meaningful learning, and the teacher's role as a facilitator. However, their depth of understanding varied. Context was the most readily recognized aspect, although some students viewed it merely as an everyday-life example, while others understood it as a starting point for developing mathematical strategies and representations. Greater variation emerged in understanding mathematization and modeling. Some students explained the progression from contextual situations toward formal mathematical representations, whereas others described mathematization more generally as connecting everyday situations with mathematics. These findings highlight the need for learning experiences that strengthen prospective teachers' understanding of the relationships among context, strategies, models, mathematization, and formal mathematical concepts.

KEYWORDS
Students Understanding, *Realistic Mathematics Education*, Mathematization, Modeling, Prospective Mathematics Teachers

ARTICLE DOI:
https://doi.org/10.53696/venn.v5i6.672

How to Cite: Asfyra, I. B., & Nur Ismiyati. Exploring Mathematics Education Students' Understanding of Realistic Mathematics Education: A Qualitative Descriptive Study at Universitas Negeri Makassar. *Venn: Journal of Sustainable Innovation on Education, Mathematics and Natural Sciences*, *5*(6), 1358–1369. https://doi.org/10.53696/venn.v5i6.672

A. Introduction

Mathematics is an important field in education because learning mathematics helps develop logical thinking, critical thinking, and problem-solving skills. The ability to obtain mathematical answers using certain procedures alone is not sufficient. Students need to understand the concepts being taught and be able to apply them in relevant situations. Conceptual and procedural understanding are two interrelated components in the development

Copyright: © 2026 the Author(s). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC-BY) 4.0 license (https://creativecommons.org/licenses/by/4.0/).

of mathematical knowledge. Similarly, Prayitno et al. (2024) emphasized that the use of the Realistic Mathematics Education (RME) approach can improve students' conceptual and procedural understanding. Their findings indicate that mathematics learning should not focus only on obtaining answers and following procedures but should also involve understanding and making sense of mathematical concepts.

In everyday practice, mathematics learning is often conducted by presenting materials in an abstract form, providing formulas, and giving exercises that follow predetermined solution patterns. The connection between mathematical concepts and situations that are close to students' experiences has not always been an important part of the learning process. This condition may lead students to perceive mathematics as a collection of rules that must be memorized to solve problems, rather than as knowledge that can be used to understand various situations. Koskinen and Pitkäniemi (2022) found that approaches that consider context, provide concrete experiences, and involve social interaction can help students understand mathematical concepts more effectively. These findings highlight the importance of learning approaches that enable students to connect everyday situations that are close to their experiences with mathematical concepts.

One approach that can address this need is Realistic Mathematics Education (RME), which views mathematics as a human activity that develops through situations that are meaningful to students (Freudenthal, 1991). The learning process can begin with situations that students can imagine, allowing them to develop various strategies and representations before gradually arriving at more formal mathematical concepts (Risdiyanti et al., 2024). Treffers (1987) and Gravemeijer (1994) further emphasized guided reinvention and mathematization as important principles in RME. The application of contextual situations in RME can be found in various mathematical topics, including the use of a fashion context in learning rational number operations (Asfyra, 2017). For undergraduate mathematics education students, understanding RME is particularly important because they are being prepared to become mathematics teachers. Their understanding should extend beyond recognizing the characteristics of RME to understanding its theoretical foundations and how its principles guide mathematics instruction. This knowledge provides a foundation for prospective teachers to understand the relationships among contexts, models, mathematization, and mathematical concepts, as well as their implications for designing learning activities consistent with RME principles.

The implementation of RME in mathematics learning strongly depends on teachers' ability to design and manage students' learning experiences. Therefore, students in Mathematics Education programs, who will become future teachers, need to develop a good understanding of the approach as preparation for their teaching practice. Understanding RME is not demonstrated merely by the ability to explain its definition and principles, but also by the ability to understand the function of contexts, the process of mathematization, the characteristics of learning activities, and the roles of teachers and students. For example, Khairunnisak et al. (2024) found differences in teachers' understanding of RME principles after participating in professional development activities, particularly in their understanding of the reality principle. This finding indicates that understanding of RME may vary among individuals and therefore needs to be examined more deeply, including among prospective teachers who are still in the process of learning.

The need to understand these aspects is increasingly important because prospective teachers are not only expected to explain RME but also to recognize and provide reasons for identifying its characteristics in various learning situations. Stating that RME is related to

everyday life does not automatically indicate an understanding of the role of context in the process of mathematization and mathematical concept development. Sevinç (2025) explained that prospective mathematics teachers have varying understandings of the characteristics of realistic mathematics problems. Their understanding involves not only the relationship between problems and everyday life, but also students' experiences, the characteristics of the situations, and the possibility of using different strategies and obtaining different solutions. Tessema et al. (2025) found that prospective mathematics teachers experienced difficulties in carrying out the mathematization process when solving geometry problems through an RME-based approach. These findings indicate that prospective teachers' understanding of RME needs further examination, particularly regarding how they understand and recognize the characteristics of the approach in learning situations.

Several studies have discussed RME from different perspectives, such as teachers' understanding of RME, mathematization processes among prospective teachers, and the development of learning activities based on RME principles (Khairunnisak et al., 2024; Tessema et al., 2025; Kaya & Yavuz, 2025). In Indonesia, the PMRI approach has also been used in mathematics learning at the university level. For instance, Asfyra and Ja'faruddin (2026) investigated students' understanding of fuzzy set concepts through PMRI-based learning. Although these studies have provided insights into the use of RME/PMRI in mathematics education, they do not specifically examine how undergraduate mathematics education students understand RME itself as a learning approach. This is worth investigating because learning about RME in a university course does not necessarily mean that students fully understand its principles or how they are applied in mathematics teaching. Students may be familiar with terms such as context, mathematization, and student-centered learning, but their explanations of these ideas and how they are connected may differ. It is therefore important to explore how students interpret the main principles of RME, including the use of context, the mathematization process, and the roles of teachers and students. Based on this consideration, the present study examines undergraduate mathematics education students' understanding of RME in a Mathematics Education Study Program at an Indonesian university. The study is expected to offer insight into how prospective mathematics teachers understand RME and identify aspects that may need further attention in their preparation as future teachers.

B. Method

This study employed a descriptive qualitative approach to examine how undergraduate students understand Realistic Mathematics Education (RME). This approach was appropriate because the study focused on students' explanations and perspectives rather than testing the effect of a particular treatment (Sandelowski, 2000). The participants were 41 fifth-semester students from the Mathematics Education Study Program at Universitas Negeri Makassar. All students in the class were included in the study. Before data collection, they had received basic instruction on RME in a previous course, covering the use of context, mathematization, and the roles of teachers and students. Therefore, this study explored their understanding of RME after prior instruction.

Data were collected through eight essay test questions developed based on the main characteristics of RME. The questions covered the meaning and purpose of RME, the use of context, the roles of teachers and students, mathematization, the characteristics of RME, and examples of its implementation in mathematics learning (Hamidah et al., 2024; Tessema et al., 2025). An instrument blueprint was prepared to relate each question to the aspects being examined. The essay test format allowed students to explain their understanding and reasoning

in their own words, including their interpretation of realistic mathematical problems and possible solution strategies (Sevinç, 2025). The instrument was developed based on the literature but was not subjected to formal expert validation or pilot testing.

The test was administered individually for 60 minutes. Students were not allowed to use books, notes, or other reference materials. Before participating, students were informed about the research purpose and their consent was obtained. Their identities were protected through participant codes. No numerical scores were assigned because the responses were analyzed qualitatively. Follow-up interviews were conducted with selected students whose written responses were interesting, unclear, or different from those of others. The interviews aimed to clarify their reasoning and deepen the interpretation of their understanding of RME.

Students' responses were analyzed by reading and grouping them according to predetermined RME aspects: the meaning and purpose of RME, context, teacher and student roles, mathematization, and RME implementation. The analysis focused on similarities and differences in the clarity, accuracy, and depth of students' explanations. For example, responses about context were examined to distinguish between those who viewed it merely as an everyday-life example and those who understood it as a starting point for developing mathematical strategies. Unclear or different responses were examined further through follow-up interviews. The interview findings were used to clarify and support the interpretation of written responses. The results were presented descriptively using selected excerpts from both data sources (Mayring, 2021).

C. Results and Discussion

The data analysis focused on students' written responses regarding their understanding of the Realistic Mathematics Education (RME) approach, which were further explored through interviews with selected students. The written responses were used to examine how students explained the concepts and main characteristics of RME, while the interviews aimed to clarify their written responses and explore the reasoning underlying their understanding of these concepts. In general, students understood RME as a mathematics learning approach that emphasizes meaningful learning, the use of real-life situations, student activities, and connections between mathematics and everyday life. However, the depth of their understanding varied, particularly when they were asked to explain the relationships among context, the strategies used, models, and mathematical thinking processes.

Students' Understanding of RME as Meaningful and Contextual Learning

The analysis showed that most students understood RME as an approach intended to make mathematics learning more meaningful and easier to understand by using problems that are relevant to students' lives. Students did not associate RME merely with the ability to solve problems, but also with efforts to help students understand why a concept exists and recognize the connections between mathematics and situations they encounter in everyday life. For example, M1 associated RME with active student involvement and deeper understanding, while M10 explained that context can serve as a bridge that helps students understand mathematical concepts.

However, the term "real-life context" was not always understood in the same way. In several responses, context was used as an example or everyday situation to make mathematical concepts easier to understand. Students used examples such as pizza, cake, shopping, measuring objects, and situations in their surroundings to explain learning through the RME approach. These responses indicate that students understood the relationship between mathematics and

everyday life, but did not always explain how context can serve as a starting point for mathematical activity.

A deeper understanding was evident in M14's response. This student connected context with student activities, the use of models, and the progression toward formal mathematics. In the written response, context was viewed as the starting point of learning and as a means of thinking that helps students understand a problem before moving toward more abstract symbols or formulas.

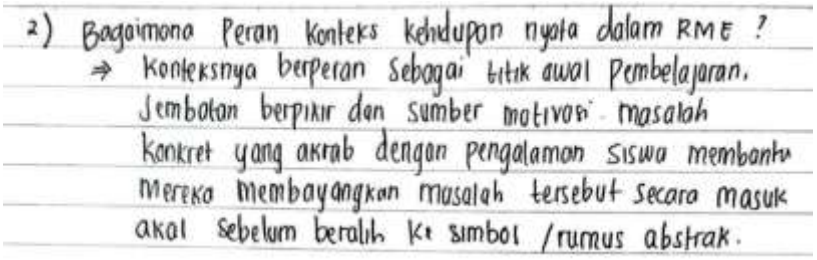

2) Bagaimana Peran Konteks kehidupan nyata dalam RME ?
⇒ Konteksnya berperan sebagai titik awal Pembelajaran. Jembatan berpikir dan sumber motivasi. masalah Konkret yang akrab dengan pengalaman siswa membantu Mereka membayangkan masalah tersebut secara masuk akal sebelum beralih ke simbol / rumus abstrak.

Figure 1. Excerpt from M14's response regarding the use of context as part of the RME learning process.

2) What is the role of real-life contexts in RME?
→ Context plays a role as a starting point for learning, a bridge for thinking, and a source of motivation. Concrete problems that are closely related to students' experiences help them imagine the problems meaningfully before moving on to abstract symbols/formulas.

The interview with M14 further clarified this understanding.

Researcher: You mentioned that a real-life context becomes the "starting point of learning." What do you mean by this?

M14: It means that learning begins with a problem related to students' everyday lives. Students first understand the problem and then look for ways to solve it.

Researcher: So, is context in RME only used as an example?

M14: No. Context helps students think about and find ways to solve a problem before they understand the more formal mathematical concept.

M14's explanation suggests that context was understood not merely as an illustration of everyday life but as a starting point for students to explore problems and develop their own solution strategies. This understanding is consistent with a central characteristic of RME, in which contextual situations provide opportunities for students to develop informal strategies and representations before moving toward more formal mathematical concepts. In this process, models can serve as a bridge between students' initial reasoning about contextual problems and more formal mathematical representations. However, M14's explanation primarily reflects an understanding of the role of context and students' problem-solving activities; it does not necessarily demonstrate a complete understanding of the development of mathematical models. This distinction is important because recognizing the role of context is not the same as being able to explain all stages of mathematization or the development of models in RME.

The written responses of the 41 students also need to be considered to understand the variation in their interpretations of context. Some students described context mainly as an example taken from everyday life, whereas others explained its role in initiating mathematical thinking and problem solving. The interview with M14 provides an illustration of the latter interpretation. These findings indicate that students could recognize the importance of context,

although their explanations differed in how they connected contextual situations with mathematical activity and the development of mathematical concepts.

Students' Understanding of the Roles of Teachers and Students in RME

How students described the roles of teachers and students during the learning process reflected the extent to which they understood the RME approach. Most students stated that teachers should not merely provide formulas and solution procedures, but should also act as facilitators and guides who present problems, provide guidance, support discussions, and assist students when they encounter difficulties. At the same time, students were viewed as active participants who understand problems, seek ways to solve them, engage in discussions, use models, and construct concepts based on their activities.

M10, for example, explained that the teacher acts as a facilitator and guide who provides contextually relevant problems and helps students develop ways to solve them. Students were viewed as active participants in developing strategies, constructing models, engaging in discussions, and discovering relevant concepts. M11's response reflected a similar understanding, while M21 emphasized that students should be given space to solve problems using strategies of their own choice.

However, several responses showed that the understanding of the concepts of "teacher as facilitator" and "student as active learner" was not always accompanied by an explanation of how these processes actually take place. Student activities were sometimes described generally as discussing or finding answers, without connecting them to strategy development, the use of models, comparison of solution methods, and the process of mathematization.

The interview with M10 provided a more detailed explanation of this understanding.

Researcher : In your response, you described the teacher as a facilitator. What does the teacher do as a facilitator in the RME learning process?

M10 : The teacher gives students a problem, then helps and guides them when they have difficulties. The teacher does not immediately provide the formula or the answer.

Researcher : What if students find different ways to solve the problem?

M10: The teacher can ask students to explain their methods, and then they can discuss them together. This way, students know that there are several methods for solving a problem.

Researcher: Then, what is the role of the students in this process?

M10: Students need to be actively involved in understanding the problem, trying their own strategies, discussing with others, and finding relevant concepts

from the given problem.

M10's statement shows that the concept of the teacher as a facilitator was connected to concrete actions, namely presenting problems, providing assistance when needed, and giving students opportunities to explain and compare strategies. This indicates that students' understanding of the roles of teachers and students became clearer when they were asked to describe the learning process in concrete terms.

Variations in Students' Understanding of Mathematization and Modeling

Variations in students' understanding became more apparent when they explained the process of mathematization. Some students were able to explain mathematization as the process of transforming real-world problems into mathematical forms and continuously developing their representations toward more formal forms. Several students explicitly referred to the concepts of horizontal and vertical mathematization. M2 explained that horizontal mathematization is the process of transforming a problem situated in a context into a mathematical form, whereas vertical mathematization involves developing that mathematical

form toward a more formal level. Similar explanations were also found in the responses of M4, M8, M24, M26, M27, M34, M38, and M40.

Understanding of models also emerged from the students' responses. M10 and M14 viewed a model as a tool that helps students understand problems and connect their informal ways of thinking with more formal mathematical forms. M25 explained that a real-world problem can first be transformed into a mathematical form or model before being used to find a solution. These responses indicate that students had begun to understand the relationship among context, students' learning strategies, models, and the process of developing formal mathematical understanding.

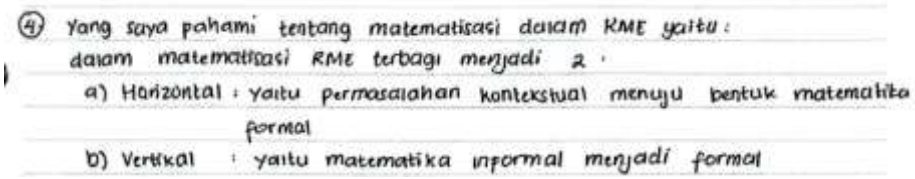

④ Yang saya pahami tentang matematisasi dalam RME yaitu :
dalam matematisasi RME terbagi menjadi 2 :
a) Horizontal : yaitu permasalahan kontekstual menuju bentuk matematika formal
b) Vertikal : yaitu matematika informal menjadi formal

Figure 2. Excerpt from M2's written response regarding their understanding of horizontal and vertical mathematization in RME.

"What I understand about mathematization in RME is:
In RME mathematization is divided into two:
a) Horizontal: from contextual problems toward a formal mathematical form.
b) Vertical: informal mathematics becomes formal."

The interview with M2 further clarified how the student understood the process of mathematization.

Researcher : In your response, you explained horizontal and vertical mathematization. In your view, what happens when a student first encounters a situation related to a real-life context?

M2 : Students first understand the given problem and then try to connect it with an appropriate mathematical concept or form in order to solve the problem.

Researcher : What does it mean to transform a contextual problem into a mathematical form?

M2 : In my opinion, students begin by constructing a model or representing the information from the problem in mathematical form so that the problem becomes easier to solve.

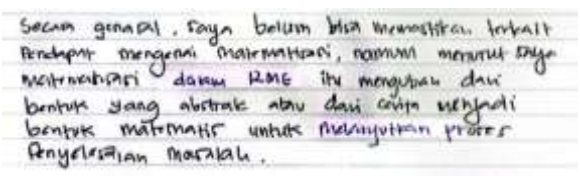
Researcher : Then, what distinguishes mathematization from simply solving a word problem?

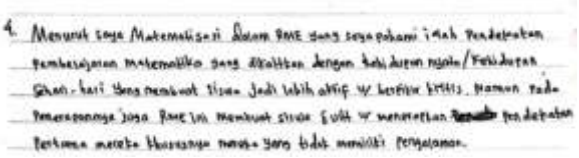
M2 : In mathematics, students do not immediately use a formula. They first need to understand the problem, then transform it into a mathematical form, and continue until they arrive at a concept or a more formal mathematical form.

M2's explanation indicates that mathematization was understood as a gradual process that connects a contextual situation to a more formal mathematical form. This understanding goes beyond merely recognizing the terms horizontal and vertical mathematization; it also encompasses the relationship between understanding the problem, constructing a model, and progressing toward a more formal mathematical form.

Developing Understanding of Mathematization

Although some students were able to explain mathematization relatively comprehensively, several responses indicated that their understanding was still developing. M22 explicitly expressed uncertainty about the meaning of mathematization, although the student subsequently associated it with the process of transforming a story or problem into





mathematical form. Meanwhile, M33 associated mathematization with mathematics learning connected to real-life situations and students' active involvement, but did not specifically explain how the mathematization process takes place.

Figure 3. Excerpts from the written responses of M22 and M33 indicating an incomplete understanding of the concept of mathematization in RME.

Image 1:
"In general, I am still unable to clearly explain my understanding of mathematization. However, in my opinion, mathematization in RME involves transforming an abstract form or a story into a mathematical form as part of the process of solving a problem."
Image 2:
"In my understanding, mathematization in RME is a mathematics learning approach that is connected to real-life situations/everyday life, which makes students more actively engaged in critical thinking. However, in its implementation, RME can also make it difficult for students to apply the approach at first, particularly those who do not have prior experience."

The findings were further explored through interviews. M22 explained:

"If we only provide examples from everyday life, in my opinion, that is the use of context. Mathematization is more about the process of transforming the problem into a mathematical form." (M22)

A similar response was found in M33. When asked to explain the meaning of mathematization again, M33 stated:

"The use of context is more about taking examples from everyday life, whereas mathematization involves a process of transforming or connecting the problem to mathematics." (M33)

The two interviews indicate that the students' understanding of mathematization became clearer when they were given an opportunity to explain their ideas orally. M22 more explicitly distinguished the use of context from mathematization, while M33 began to identify the process of connecting contextual problems to mathematics. Thus, the lack of clarity in the written responses does not necessarily indicate an absence of understanding, but may indicate that the students' understanding had not yet been fully articulated in written form. At the same time, the explanations provided by both students remained general and did not yet demonstrate an in-depth understanding of the relationships among context, models, strategies, and the progression toward formal mathematics.

The findings show that context is the most easily recognized aspect of RME among the students. Students were able to identify everyday-life situations as a characteristic of RME, but their understanding of the role of context varied. Some students viewed context as an example used to clarify the material, whereas students with a more developed understanding connected context with learning activities and progression toward more formal mathematics.

This difference is important because, in the RME approach, context is not used merely to make mathematical problems appear more closely related to students' lives. Context should provide opportunities for students to explore situations, develop strategies, and construct representations. Sari et al. (2025) stated that, in the iceberg model, the situational context serves as the initial part that connects students' experiences with the development toward *model-of*, *model-for*, and more formal mathematical concepts. This finding helps explain why students more readily understand context than its educational function throughout the RME learning process.

Regarding the roles of teachers and students, students generally understood the shift from teacher-centered learning to a learning model that provides greater opportunities for student activity. However, some responses still reflected an understanding that was primarily declarative. Students might describe the teacher as a facilitator but were not always able to explain the specific actions teachers take to support the development of students' strategies and mathematical thinking.

In RME, the teacher's role involves more than simply withholding direct answers. Teachers need to design problems that allow students' strategies to emerge, ask questions that support exploration, organize discussions, and help students develop informal thinking toward more formal mathematical forms. Tessema et al. (2025) showed that prospective mathematics teachers still face challenges in the mathematization process, including constructing representations, making generalizations, and connecting strategies with mathematical concepts. This finding reinforces the results of the present study, suggesting that understanding the teacher's role in RME needs to be connected to how teachers facilitate the development of students' mathematical thinking.

The greatest variation in understanding was found in mathematization. Some students were able to explain horizontal and vertical mathematization and relate them to the progression from contextual problems toward more formal mathematical forms. However, others still described mathematization generally as the process of connecting mathematics with everyday life. This indicates that the ability to mention RME terminology does not necessarily demonstrate an understanding of the relationships among the components of the learning process.

This finding is consistent with Tessema et al. (2025), who reported that prospective mathematics teachers experienced difficulties in the mathematization process, particularly in constructing representations, making generalizations, and connecting strategies with mathematical concepts. Sari et al. (2025) also showed that the development of understanding in RME occurs through relationships among context, models, and formal mathematical concepts. Thus, the variation found in the present study can be interpreted as differences in levels of understanding: students generally found it easier to recognize the observable characteristics of RME in the learning process, but required deeper understanding to explain the relationships among these components.

These findings have implications for the way prospective mathematics teachers are prepared. RME learning should provide experiences beyond simply recognizing the definition

and characteristics of the approach. Students need to understand how real-world problems can serve as starting points for mathematical learning, how informal thinking develops through the use of models, and how discussion and reflection can support progression toward more formal mathematical understanding. Sari et al. (2025) emphasized the importance of the relationships among context, models, and formal concepts in prospective teachers' learning experiences, while Nursyahidah et al. (2025) showed that meaningful learning experiences should integrate context, problem solving, mathematical communication, and the design of learning activities.

Therefore, RME learning in mathematics teacher education should not merely involve students receiving theoretical knowledge, but should also engage them as participants who experience, analyze, and reflect on the learning process. Students should be given opportunities to compare different approaches to solving problems, identify the role of the models used, analyze students' responses, and reflect on teachers' actions during the learning process. Such experiences may help students move from merely recognizing the characteristics of RME toward being able to explain the relationships among its components and develop learning plans that are consistent with RME principles.

Overall, the Mathematics Education students in this study demonstrated a relatively good understanding of RME, particularly regarding meaningful learning, the use of context, student activity, and the teacher's role as a facilitator. However, the depth of their understanding was not uniform. Greater variation was found in mathematization and modeling, particularly when students were asked to explain the relationships among context, students' strategies, the models they constructed, and formal mathematics. The findings indicate that students found it easier to recognize the observable characteristics of RME in the learning process than to explain the mathematical processes underlying the relationships among these characteristics.

D. Conclusion

This study explored how undergraduate mathematics education students understand Realistic Mathematics Education (RME) after receiving basic instruction on the approach. The findings show that students were able to identify several key aspects of RME, particularly meaningful learning, the use of context, student activity, and the teacher's role as a facilitator. However, differences were found in their explanations of mathematization and modeling. While some students could describe how contextual situations are developed into mathematical representations and formal concepts, others mainly associated mathematization with connecting mathematics to everyday life.

The contribution of this study lies in providing insight into how prospective mathematics teachers interpret the principles of RME, including aspects that they understand and those that require further attention. These findings suggest that mathematics teacher education programs should provide opportunities for students to examine the connections among context, models, strategies, mathematization, and formal mathematical concepts, rather than focusing only on the characteristics of RME. Future research could explore how students' understanding develops through RME-based learning experiences and examine how this understanding is reflected in their ability to design and implement RME-based mathematics lessons. Such studies could provide further insight into the preparation of prospective mathematics teachers to apply RME principles in classroom practice.

Artificial Intelligence Use Statement	
The authors used ChatGPT (GPT-5.6) to assist with language editing and improving the overall writing of the manuscript. All outputs were reviewed and verified by the authors, who take full responsibility for the content of the article.	
Author Contribution Statement	
Intan Buhati Asfyra	*Conceptualization, methodology, instrument development, data collection, data analysis, initial manuscript drafting, and manuscript editing.*
Nur Ismiyati	*Investigation, data collection, data analysis, validation, manuscript review, and manuscript editing.*
Funding Statement	
This research received no funding from any governmental, private, or non-profit organization.	
Conflict Of Interest Statement	
The authors declare that there is no conflict of interest related to the research, authorship, or publication of this article.	

Daftar Pustaka

Asfyra, I. B. (2017). Konteks busana pada pembelajaran operasi bilangan rasional dengan pendekatan PMRI. *Jurnal Gantang, 2*(1), 11–19. https://doi.org/10.31629/jg.v2i1.61

Asfyra, I. B., & Ja'faruddin, J. (2026). Deskripsi pemahaman konsep himpunan fuzzy mahasiswa melalui pembelajaran PMRI. *Jurnal Penelitian Pendidikan Matematika, 10*(1), 16–28. https://doi.org/10.32502/jp2m.v10i1.11222

Freudenthal, H. (1991). Revisiting mathematics education: China lectures. Kluwer Academic Publishers

Gravemeijer, K. P. E. (1994). Developing realistic mathematics education. CD-β Press, Freudenthal Institute, Utrecht University.

Hamidah, I., Zulkardi, Z., Putri, R. I. I., & Pramuditya, S. A. (2024). How is the implementation of realistic mathematics education on mathematical literacy skills? A systematic literature review. *Mosharafa: Jurnal Pendidikan Matematika, 13*(3), 741–756. https://doi.org/10.31980/mosharafa.v13i3.2089

Kaya, D., & Yavuz, S. (2025). Evaluation of creative activities prepared with an ethnomathematics approach from the perspective of realistic mathematics education principles. *Irish Educational Studies*, 1–23. https://doi.org/10.1080/03323315.2025.2546964

Khairunnisak, C., Johar, R., Maulina, S., Zubainur, C. M., & Maidiyah, E. (2024). Teachers' understanding of realistic mathematics education through a blended professional development workshop on designing learning trajectory. *International Journal of*

Mathematical Education in Science and Technology, 55(4), 805–828. https://doi.org/10.1080/0020739X.2022.2038800

Koskinen, R., & Pitkäniemi, H. (2022). Meaningful learning in mathematics: A research synthesis of teaching approaches. *International Electronic Journal of Mathematics Education, 17*(2), em0679. https://doi.org/10.29333/iejme/11715

Mayring, P. (2021). *Qualitative content analysis: A step-by-step guide*. SAGE Publications.

Nursyahidah, F., Wardono, W., Mariani, S., & Wijayanti, K. (2025). Integrating technology, Javanese ethnomathematics, and realistic mathematics education in supporting prospective mathematics teachers' numeracy skills: A learning trajectory. *Journal on Mathematics Education, 16*(2), 671–688. https://doi.org/10.22342/jme.v16i2.pp671-688

Prayitno, S. H., Gunawan, W., Fiantika, F. R., Hartono, & Holisin, I. (2024). Realistic mathematics education (RME) learning model improves conceptual and procedural understanding of junior high school students. *Jurnal Pendidikan Indonesia, 13*(2), 317–325. https://doi.org/10.23887/jpiundiksha.v13i2.75228

Risdiyanti, I., Zulkardi, Z., Putri, R. I. I., Prahmana, R. C. I., & Nusantara, D. S. (2024). Ratio and proportion through realistic mathematics education and pendidikan matematika realistik Indonesia approach: A systematic literature review. *Jurnal Elemen, 10*(1), 158–180. https://doi.org/10.29408/jel.v10i1.24445

Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health, 23*(4), 334–340. https://doi.org/10.1002/1098-240X(200008)23:4<334::AID-NUR9>3.0.CO;2-G

Sari, Y. M., Fiangga, S., El Milla, Y. I., Shahrill, M., & Yanti, L. P. (2025). Prospective teachers' iceberg designs in realistic mathematics education approach: Connecting mathematics and the SDGs. Journal on Mathematics Education, 16(3), 981–1000. https://doi.org/10.22342/jme.v16i3.pp981-1000

Sevinç, Ş. (2025). Pre-service mathematics teachers' personal meanings proclaiming about the characteristics of realistic mathematics problems. *Mathematics Education Research Journal, 37*(3), 455–482. https://doi.org/10.1007/s13394-024-00497-x

Tessema, G., Michael, K., & Areaya, S. (2025). Pre-service mathematics teachers' mathematization process in solving geometry problems. *Discover Education, 4*, 358. https://doi.org/10.1007/s44217-025-00551-1

Treffers, A. (1987). Three dimensions: A model of goal and theory description in mathematics instruction—The Wiskobas project. D. Reidel Publishing Company. https://doi.org/10.1007/978-94-009-3707-9