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THE IMPACT OF THE REALISTIC MATHEMATICS EDUCATION APPROACH WITH UNIT CUBES ON FIFTH GRADE STUDENTS CONCEPTUAL UNDERSTANDING

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Abstract

This research is motivated by the low understanding of mathematical concepts at MIN 26 Aceh Besar. Data obtained from 26 students show that 27.88% of students can solve problems with the indicator of restating a concept, 41.35% can solve problems with the indicator of identifying examples and non-examples of a concept, and 30.77% can solve problems with the indicator of identifying objects according to specific properties in line with the concept. The low understanding of these concepts is due to the lack of students' desire to learn the material presented and their failure to pay attention to the material explained by the teacher. This study aims to determine the impact of the Realistic Mathematics Education (RME) approach assisted by unit cube props on the conceptual understanding of fifth-grade students at MIN 26 Aceh Besar. This research uses a quantitative method with a true-experimental design. The population in this study comprises all fifth-grade students at MIN 26 Aceh Besar, while the samples are class Va, consisting of 26 students, and class Vb, consisting of 23 students. The instrument used in this research is a test to measure students' conceptual understanding. The data collection technique is a test in the form of a pre-test and post-test. Data analysis techniques include converting ordinal data into interval data using the Method of Successive Intervals (MSI), creating frequency distribution lists, calculating average values, conducting normality tests, homogeneity tests, equality of two means tests, regression tests, and hypothesis tests. Based on the analysis results, the average score obtained in the experimental class pre-test is 12.59 and in the control class is 11.17. Meanwhile, the post-test average score for the experimental class is 18.598, and for the control class, it is 13.672. The analysis results show that t_{calculated} = 9.425 and t_{table} = 1.677; since t_{calculated} > t_{table}, Ho is rejected, and Ha is accepted.

Keywords: Realistic Mathematics Education, Unit Cube Props

Abstrak

Penelitian dilatarbelakangi oleh hasil pemahaman konsep matematika di MIN 26 Aceh Besar yang masih cukup rendah, diperoleh data dari 26 siswa, 27,88% siswa yang dapat mengerjakan soal dengan indikator menyatakan ulang suatu konsep, 41,35% siswa yang dapat mengerjakan soal dengan indikator mengidentifikasi contoh dan bukan contoh dari suatu konsep, 30,77% siswa yang dapat mengerjakan soal dengan indikator mengidentifikasi obyek-obyek menurut sifat-sifat tertentu sesuai dengan konsepnya. Rendahnya pemahaman konsep ini disebabkan oleh kurangnya keinginan siswa dalam mempelajari materi yang disampaikan dan mereka tidak menyimak materi yang sedang dijelaskan oleh guru. Penelitian ini bertujuan untuk mengetahui dampak Pendekatan *Realistic Mathematics Education* (RME) Dengan Berbantuan Alat Peraga Kubus Satuan Terhadap Pemahaman Konsep Siswa Kelas V Min 26 Aceh Besar. Penelitian ini menggunakan metode kuantitatif dengan desain *true-experimental*. Populasi dalam penelitian ini adalah seluruh siswa kelas V MIN 26 Aceh Besar, sedangkan sampelnya ialah kelas Va yang berjumlah 26 siswa dan kelas Vb yang berjumlah 23 siswa. Instrumen yang digunakan dalam penelitian ini berupa soal tes untuk mengukur pemahaman konsep siswa. Teknik pengumpulan data adalah tes yang berupa *pre-test* dan *post-test.* Teknik analisis data dilakukan melalui analisis data tes kemampuan pemahaman konsep dengan beberapa tahapan diantaranya mengubah data ordinal menjadi data interval dengan menggunakan *Method Successive Interval* (MSI), membuat daftar distribusi frekuensi, menghitung nilai rata-rata, melakukan uji normalitas, melakukan uji homogenitas, melakukan uji kesamaan dua rata-rata, melakukan uji regresi, dan melakukan uji hipotesis. Berdasarkan hasil analisis yang telah dilakukan, nilai rata-rata yang diperoleh pada *pre-test* kelas eksperimen ialah 12,59 dan kelas kontrol dengan nilai rata-rata 11,17. Sedangkan *post-test* kelas eksperimen adalah 18,598 dan kelas kontrol dengan nilai rata-rata 13,672. Hasil analisis t_{hitung}= 9,425 dan t_{tabel}= 1,677, karena $t_{hitung} > t_{tabel}$ maka Ho ditolak dan Ha diterima.

Kata kunci: Pendidikan Matematika Realistis, Alat Peraga Kubus Satuan

INTRODUCTION

Education is the main pillar in building an intelligent and moral society (Almeida et al., 2020). In Islam, the importance of education is highly emphasized, as stated in the Qur'an, Surah Al-Mujadilah, verse 11: "Allah will raise those who have believed among you and those who were given knowledge, by degrees." This verse underscores that the attainment of knowledge is one of the paths to elevate a person's status before Allah and in society. Furthermore, in a hadith, the Prophet Muhammad (peace be upon him) said: "Seeking knowledge is an obligation upon every Muslim" (Narrated by Ibn Majah). This hadith indicates that seeking knowledge is a duty that must be fulfilled by every Muslim individual. These Qur'anic verses and hadith provide a strong moral and ethical foundation for emphasizing the importance of education, including mathematics education. Here are some specific connections between these verses and hadith and students' understanding of mathematical concepts:

Elevation of Status Through Knowledge, Surah Al-Mujadilah, verse 11, states that Allah will elevate the status of those who believe and possess knowledge. This means that

students' efforts in understanding mathematical concepts can be seen as a form of worship and an endeavor to attain a higher status in the sight of Allah. Students who work diligently in learning mathematics are not only striving for academic achievement but also enhancing their spiritual status (Gistituati et al., 2020; Sholeh & Fahrurozi, 2021).

Obligation to Seek Knowledge: The hadith states, "Seeking knowledge is an obligation upon every Muslim," emphasizing that acquiring knowledge is a duty that must be fulfilled by every Muslim individual. In the context of learning mathematics, this obligation provides additional motivation for students to thoroughly understand mathematical concepts. They realize that their efforts in studying are part of fulfilling their religious duty, which adds intrinsic value to their academic endeavors (Bahar & Juhrianto, 2022).

Use of Intellect in Learning Mathematics: Islam encourages its followers to use their intellect and think critically. Understanding mathematical concepts requires the ability to think logically and analytically, which is a manifestation of utilizing the intellect bestowed by Allah. Allah's command in the Qur'an, Surah An-Nahl, verse 78, highlights this:

وَاللّٰهُ اَخْرَجَكُمْ مِّنْۢ بُطُوْنِ اُمَّهٰتِكُمْ لَا تَعْلَمُوْنَ شَيْـًٔاۙ وَّ جَعَلَ لَكُمُ السَّمْعَ وَالْاَبْصٰرَ وَالْاَفْـِٕدَةَۙ لَعَلَّكُمْ تَشْكُرُوْنَ

The meaning is:

"And Allah brought you forth from the wombs of your mothers while you knew nothing, and He gave you hearing, sight, and hearts that you might give thanks (to Allah)."

This verse indicates that the ability to think and learn is a gift that should be utilized to the fullest, including in learning mathematics (Radiusman, 2020).

MIN 26 Aceh Besar is a primary school located in the Aceh Besar area. This school plays a crucial role in providing education for the local community. However, the educational environment at this school often faces a number of challenges that need to be addressed. One of the main challenges is the limited educational resources. As an educational institution in an area with restricted educational resources, MIN 26 Aceh Besar often struggles to provide adequate teaching materials. Limited textbooks and a lack of access to quality learning materials are major obstacles in efforts to enhance students' understanding of mathematical concepts.

From the initial research conducted by the author in the fifth grade of MIN 26 Aceh Besar, where students were given questions designed according to the indicators of understanding concepts in the preliminary test, data were collected from 26 students. The results showed that only 27.88% of students successfully answered questions that required the ability to restate a concept, 41.35% of students succeeded in questions that required the ability to identify examples and non-examples of a concept, and 30.77% of students were able to answer questions related to identifying objects based on certain properties that corresponded to the concept. Based on these findings, the author concluded that the understanding of mathematical concepts among these students is still in the low category.

The learning outcomes indicate that the students have not fully mastered the material taught by the teachers. This is due to the limited availability of teaching aids, which poses a serious challenge in mathematics education. The lack of access to necessary mathematical aids for visually demonstrating mathematical concepts makes the learning process less effective. Special educational tools like mathematical manipulatives are often not available or are limited, complicating the teacher's ability to explain abstract concepts to students.

Moreover, the disadvantaged economic background of most students also contributes to the difficulties in understanding mathematical concepts. Many students at MIN 26 Aceh Besar come from families with financial constraints, which can affect the availability of

educational support resources at home. The lack of access to reference books, the internet, or even parental support in home learning can be additional factors that complicate the mathematics learning process for students.

By identifying these challenges, it is important to seek appropriate solutions to improve the quality of mathematics education at MIN 26 Aceh Besar. Steps such as improving access to quality teaching materials, providing adequate mathematical teaching aids, and implementing support programs for students from economically disadvantaged backgrounds can help overcome these obstacles. Thus, MIN 26 Aceh Besar can become a more conducive environment for effective and inclusive mathematics learning for all students.

At MIN 26 Aceh Besar, the challenges in mathematics learning are primarily evident in students' difficulties in understanding abstract mathematical concepts. For example, when faced with topics such as volume, measurement, and numerical operations, many students are unable to relate the lessons to real-life experiences or familiar contexts. This situation creates significant barriers to understanding and applying the material in everyday life, which should be one of the primary goals of mathematics education.

The teaching approach predominantly used in this school tends to be traditional, where mathematics instruction often focuses more on rote memorization and mechanical procedure following. This method is less effective in building deep conceptual understanding because it does not encourage students to question, explore, and apply knowledge in new contexts. As a result, many students may be able to solve routine problems but struggle when challenged with problems requiring critical and creative thinking (Mukhtar, 2021).

To address this issue, a change in the approach to mathematics teaching at MIN 26 Aceh Besar is needed. Realistic Mathematics Education (RME) could be a valuable solution. RME is a teaching method that emphasizes the use of real-life contexts relevant to students' lives as a starting point in learning mathematical concepts. This approach is designed to help students not only understand mathematical procedures but also comprehend the reasoning behind these concepts and how to apply them in various situations (Mardiah et al., 2020).

One of the advantages of RME is its ability to help students build their own mental models of mathematical concepts through problem-based learning experiences rooted in real-world contexts. This is highly suitable for the context at MIN 26 Aceh Besar, where students can more easily relate lesson materials to their everyday lives, such as using concepts of volume to understand how to fill water into containers or measurements for cooking activities at home. Additionally, the use of manipulatives such as unit cubes in RME can enhance the visualization of abstract concepts, making it easier for students to understand and manipulate mathematical objects concretely (Mailani et al., 2022; Erlina & Sutarni, 2024).

Realistic Mathematics Education (RME) is a mathematics learning approach that shifts the focus from mechanical understanding of concepts to deep understanding and practical application in everyday life contexts. The main principles of RME include using real-life contexts as the starting point of learning, facilitating interactions among students to build shared understanding, and encouraging students to discover and develop mathematical concepts on their own. This approach contrasts with traditional teaching methods that often emphasize rote memorization and mechanical application of mathematical procedures. Instead, RME prioritizes deep understanding, where students are not only given correct answers but also provided with opportunities to actively and creatively explore mathematical concepts (Gistituati et al., 2020; Putri & Ariani, 2020).

The Realistic Mathematics Education (RME) approach according to Gravemeijer consists of five main steps. First, understanding contextual problems, where students are given problems originating from real-life situations or contexts relevant to their experiences. Students are encouraged to understand the context of the problem and identify what is being asked in the question. Second, explaining contextual problems. After understanding the problem, students are asked to explain the problem in their own words, which may involve group or class discussions to ensure all students understand the situation and questions posed. Third, solving contextual problems, where students work individually or in groups to find solutions to the problem, using various strategies and relevant aids. Fourth, comparing and discussing answers. At this stage, students share and compare the solutions they have found with their classmates, discussing the various approaches used, and evaluating the strengths and weaknesses of each solution. Finally, summarizing, where students together summarize the results of the discussion, formulate the mathematical concepts learned, and link them back to the contextual problems given at the beginning. This approach helps students develop a deep and meaningful understanding of mathematical concepts (Wahyudi, 2023).

The Realistic Mathematics Education (RME) approach, according to Ariyadi Wijaya, emphasizes the use of meaningful contexts, such as games or manipulatives, as a starting point in mathematics learning, facilitating the transition from concrete to formal mathematics through a progressive mathematization approach. In RME, students are given the freedom to develop their own problem-solving strategies, allowing for diversity in constructing mathematical understanding. This learning process is also interactive and social, where students communicate and share ideas, enriching the learning process. Additionally, RME integrates interconnected mathematical concepts, not isolating them from each other, connecting learning with students' surrounding environments to deepen understanding and enhance material retention (Sari, 2019).

The Realistic Mathematics Education (RME) approach has several advantages. First, students construct their own knowledge, making it more ingrained and less easily forgotten. Second, the learning process becomes more enjoyable by linking mathematics to everyday life realities, preventing students from getting bored quickly. Third, students feel valued and more open because every answer they provide is appreciated. Fourth, this approach fosters cooperation within groups. Additionally, RME trains students to explain their answers courageously and encourages them to think critically and express their opinions. Lastly, this approach also supports character education (Elwijaya, Harun, & Helsa, 2021).

However, RME also has several disadvantages. First, because students are accustomed to receiving information first, they often struggle to find answers on their own from the given problems. Second, this approach requires more time, especially for students who are weak in understanding concepts. Third, more adept students sometimes lack patience waiting for their peers who have not finished. Lastly, this approach requires appropriate teaching aids for the learning situation, which can sometimes be difficult to provide (Gistituati et al., 2020).

By using real-life contexts as a starting point for learning, RME allows students to see the relevance of mathematics in their daily lives. This helps students to connect mathematical concepts with their personal experiences, thereby clarifying the meaning and practical application of the subject matter. Additionally, RME encourages interaction among students, both in the form of group discussions and cooperation in problem-solving. Through this

interaction, students can exchange ideas, share strategies, and support each other in understanding complex mathematical concepts (Angreni, 2021).

Furthermore, the RME approach places emphasis on students as active constructors of their own knowledge. Students are given the opportunity to discover and develop mathematical concepts through self-directed exploration and investigation. This not only enhances their conceptual understanding but also builds their confidence and sense of ownership over the material. Thus, Realistic Mathematics Education (RME) not only changes how students learn mathematics but also how they understand and apply these concepts in everyday life. Through an engaging, relevant, and student-centered approach, RME helps create a learning environment that promotes deep understanding and practical application skills, aligning with the increasingly complex demands of the modern world (Mukhtar, 2021).

In this study, the use of unit cube manipulatives was identified as a highly significant strategy in helping students understand abstract mathematical concepts. Manipulatives like unit cubes allow students to visually and physically manipulate objects, supporting the formation of a deeper conceptual understanding. This ability is crucial in mathematics education, as it helps to concretize concepts that may seem unclear or overly theoretical to many students (Setyawan, 2020).

The importance of using mathematical manipulatives, such as unit cubes, lies in their ability to make complex mathematical concepts more concrete and accessible to all students. By touching, feeling, and manipulating the cubes, students can directly experience how mathematical concepts work in real-life contexts. This process enables them to build strong mental images and relate mathematical concepts to their everyday practical experiences, facilitating deeper understanding and long-term learning success (Permatasari et al., 2023; Safira, Aini, & Shaffiyah, 2024).

Additionally, the use of unit cubes can also help students who may struggle with understanding abstract concepts. By providing a tangible visual representation and immediate feedback on their actions, unit cubes help clarify concepts that may be difficult to comprehend verbally or symbolically. This allows all students, regardless of their ability level, to actively engage in learning mathematics and gain a deeper understanding. Thus, the use of teaching aids like unit cubes not only enhances the learning experience for students but also broadens the accessibility of mathematical education. This aligns with the principle of inclusion in education, where every student has an equal opportunity to succeed. By leveraging manipulatives in mathematical education, teachers can create a supportive, motivating, and facilitative learning environment for better conceptual understanding for all students (Permatasari et al., 2023).

By combining the RME approach and unit cube manipulatives, this research aims to determine the impact of the Realistic Mathematics Education (RME) approach with the assistance of unit cube manipulatives on the conceptual understanding of fifth-grade students at MIN 26 Aceh Besar. This research is also expected to provide significant contributions to the development of mathematics teaching methods in elementary schools, particularly at MIN 26 Aceh Besar, and to serve as a reference for teachers in improving the quality of their teaching. The results of this study are expected to demonstrate that the RME approach with the assistance of unit cube manipulatives is effective in enhancing students' understanding of mathematical concepts.

METHOD

This research adopts a quantitative approach, which aims to formulate and apply mathematical models, theories, or hypotheses related to natural phenomena. According to Sugiyono, there are several types of experimental designs, including pre-experimental (nondesigns), true-experimental, factorial experimental, and quasi-experimental. The researcher chose the true-experimental method for this study. The selected true-experimental design is the pre-test-post-test control group design.

According to Sugiyono, there are several forms of experimental designs, namely pre-experimental (nondesigns), true-experimental, factorial experimental, and quasi-experimental. The researcher chose true-experimental as the method to be used. The true-experimental research design used by the researcher is the Pretest-Posttest Control Group Design.

Table 1. Research Design (Pretest-posttest Control Group Design)

Subject	Pre-test	Treatment	Post-test
Experimental Class	O_1	X	O_2
Control Class	O_1	-	O_2

(Sugiyono, Research Methods in Education: Qualitative, Quantitative, and R&D Approaches, 2013).

Explanation:

O1 = Initial test (Pre-test) for the experimental class and the control class

O2 = Final test (Post-test) for the experimental class and the control class

X = Learning through the Realistic Mathematics Education (RME) approach

The population in this study comprises all fifth-grade students at MIN 26 Aceh Besar, consisting of three classes. The sample for this study includes 26 students from class Va, who serve as the experimental group, and 23 students from class Vb, who serve as the control group, selected using a simple random sampling technique. The simple random method was chosen randomly without considering the strata within the population. The instrument used in this study is a test to measure students' conceptual understanding, and the validity of the test items must be verified. This validation was performed by a mathematics lecturer and a mathematics teacher at MIN 26 Aceh Besar. The data collection technique used in this study is a test technique, consisting of a pre-test and a post-test. Data analysis was conducted through several steps, including converting ordinal data to interval data using the Method of Successive Intervals (MSI), creating a frequency distribution table, calculating the mean value, performing normality tests, homogeneity tests, equality of two means tests, regression tests, and hypothesis tests.

RESULTS AND DISCUSSION

The research conducted at MIN 26 Aceh Besar began with administering a pre-test to all students in both the experimental and control classes. The purpose of this pre-test was to identify the students' initial understanding of the material to be studied. By knowing their initial abilities, the researcher can ensure that any observed differences in learning outcomes are indeed due to the treatment given and not due to differences in the students' initial abilities.

Based on the results of the research and data analysis, the average pre-test score for the experimental class was 12.59, while the control class had an average score of 11.17. To

determine whether the data in the study originated from a normally distributed population, a normality test was conducted. Using a 5% significance level 5% (α= 0,05) with degrees of freedom *dk = k -1 = 5- 1 = 4*, we get $x^2\,(1-\alpha)(k-1)$ =9,49. The decision criterion is: "reject H_0 if $x^2 \geq x^2\,(1-\alpha)(k-1)$. With $\alpha = 0{,}05$, accept H_0 if $x^2 \leq x^2\,(1-\alpha)(k-1)$". Since $x^2 \leq x^2\,(1-\alpha)(k-1)$ specifically 6,31 ≤ 9,49, H_0 is accepted, and it can be concluded that the sample comes from a normally distributed population. To determine the similarity between the experimental and control samples, the researcher conducted a homogeneity test. The results of the homogeneity test indicated that there was no significant difference in variance between the experimental and control classes.

The pre-test results were further analyzed using a two-sample t-test to assess the equality of the two means. Based on a significance level α = 0,05 and degrees of freedom *dk* = 47, from the t-distribution table, we obtain $t_{(0{,}975)(47)} = 167$ thus $-t_{(1\frac{1}{2}\alpha)} < t_{\text{calculated}} < t_{(1\frac{1}{2}\alpha)}$ which is $-1{,}68 < 2{,}726 > 1{,}68$, therefore, according to the test criterion, H_0 is accepted. Thus, it can be concluded that the average pre-test scores of the experimental and control classes are not significantly different.

After obtaining the pre-test results, the researcher continued the study by implementing two different approaches in two classes. In the experimental class, the researcher employed the Realistic Mathematics Education (RME) approach, supported by the use of manipulatives such as unit cubes to help students understand the concepts of cube and rectangular prism volumes. This approach aims to make learning more concrete and relevant for students, with the hope of enhancing their understanding of the taught material. Meanwhile, in the control class, the researcher applied conventional teaching methods. In this method, teaching proceeds as usual without the use of specific manipulatives, focusing more on providing theory and traditional problem-solving exercises. Koeno Gravemeijer highlights six important concepts of the Realistic Mathematics Education (RME) approach: the use of real-world phenomena in learning, guided discovery, progressive modeling, gradual formality, social interaction, and the importance of real-world contexts and situations (Yetri et al. 2023)

Furthermore, the researcher conducted a post-test to evaluate students' conceptual understanding after receiving specific treatments. The results of the study showed that the average post-test score in the experimental class reached 18.598, while in the control class, the average student score was 13.672. Based on the normality test results of the post-test for students' conceptual understanding in both the experimental and control classes, the researcher found that the calculated chi-square value was greater than the tabulated chi-square value. Thus, it can be concluded that the post-test results using the Realistic Mathematics Education approach with the assistance of unit cube manipulatives (x^2 = 7,5200) were higher compared to the post-test results without using this approach (x^2 = 5,2627). This indicates the effectiveness of using the Realistic Mathematics Education approach with the assistance of unit cube manipulatives in enhancing students' conceptual understanding.

Next, the researcher conducted a regression analysis on the post-test results to compare students' conceptual understanding in the experimental and control classes. The researcher found that the obtained F-value was greater than the tabulated F-value. This indicates that there is a significant difference between the two groups in terms of conceptual understanding after the treatment.

The researcher then conducted a hypothesis test. From the data analysis of the hypothesis test conducted in both classes (experimental and control), the researcher obtained the following results: the testing was done with the criteria "reject Ho if the t-value > t-table, and accept Ha. If the t-value ≤ t-table, accept Ho ,reject Ha." Based on these results, it can be concluded that there is a significant influence on the conceptual understanding of fifth-grade students at MIN 26 Aceh Besar between the learning processes that use the Realistic

Mathematics Education approach with the assistance of unit cube manipulatives. This is indicated by the t-value being greater than the t-table (9,425 > 1,677).

The findings of this research are consistent with the study conducted by Puspitasari and Airlanda in 2021. They found that the Realistic Mathematics Education (RME) approach can have a positive effect on improving elementary school students' cognitive learning outcomes in mathematics. Puspitasari and their team stated that the RME method helps students understand mathematical concepts better and improves their overall academic achievement.

Additionally, the research by Puspitasari and Airlanda also showed significant differences in students' learning outcomes between classes using the Realistic Mathematics Education (RME) approach and those that did not. Students in the experimental class, taught using the RME method, demonstrated higher learning outcomes compared to students in the control class, who were not taught using the RME method. These findings reinforce the evidence that the RME approach is effective in enhancing students' understanding of mathematical concepts and learning outcomes (Puspitasari & Airlanda, 2021).

Overall, this research supports the conclusion that Realistic Mathematics Education (RME) is a highly beneficial approach to mathematics education in elementary schools. By utilizing manipulatives and real-world contexts, RME helps students connect abstract concepts with concrete situations, thus facilitating deeper and more meaningful understanding. Research by Puspitasari and other studies indicate that the implementation of RME can have a significant positive impact on students' learning outcomes, both in terms of conceptual understanding and academic achievement.

In 2020, Sarah Prihatinia and Zainil Melva conducted a study titled "Implementation of Realistic Mathematics Education Approach to Improve Mathematics Learning Outcomes in Elementary Schools (Literature Study)". This study concluded that the use of the Realistic Mathematics Education (RME) approach can have a positive impact on improving students' learning outcomes in elementary schools. The results of the research showed that the RME approach helps students engage more directly with the real-life situations they encounter daily, making the process of learning mathematics more effective and meaningful for them (Prihatinia & Zainil, 2020).

Several figures have supported the Realistic Mathematics Education (RME) approach and the use of unit cube manipulatives in the process of teaching mathematics, including Hans Freudenthal, Terezinha Nunes, the Utrecht Mathematicians' Group, and Kees Hoogland. Freudenthal, as the pioneer of RME, advocated for this approach with the belief that mathematics should be understood through the real-life contexts of students. Nunes, a leading researcher, has advocated for the use of manipulatives to facilitate a deeper understanding of mathematics. The Utrecht Mathematicians' Group, a research team from Utrecht University, has played a role in developing and disseminating the principles of RME. Meanwhile, Hoogland, as an educator and researcher, promotes the use of manipulatives within the RME context as a means to facilitate learning that is more concrete and relevant to students' everyday lives. Through their roles and contributions, these figures have helped establish the importance of the RME approach and unit cube manipulatives in enhancing the quality of mathematics education at various educational levels (Istiqomah & Widiyono 2023; Mukhtar, 2021).

CONCLUSION

Based on the research titled “The Impact of the Realistic Mathematics Education (RME) Approach with the Aid of Unit Cube Manipulatives on the Conceptual Understanding of Fifth-Grade Students at MIN 26 Aceh Besar,” it can be concluded that there is a significant effect on the mathematical conceptual understanding of fifth-grade students at MIN 26 Aceh Besar when using the Realistic Mathematics Education approach with the aid of unit cube manipulatives compared to the teaching methods that do not use this approach. This

conclusion was reached through data analysis using the t-test statistical formula at a significance level of 0.05 with degrees of freedom (df) of 47. The testing criteria used were "reject Ho if t-calculated > t-table, and accept Ha. If t-calculated ≤ t-table, accept Ho reject Ha." Since the analysis results showed that t-calculated was 9.425, which is greater than t-table of 1.677, Ho was rejected and Ha was accepted, indicating that there is a significant effect of using the RME approach with the aid of unit cube manipulatives on students' conceptual understanding.

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