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The Effect of the Realistic Mathematics Education Approach on Critical Thinking Skills as Viewed from Students' Self-Confidence

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ABSTRACT

This study aimed to analyze the effect of the Realistic Mathematics Education (RME) approach on students' mathematical critical thinking skills in terms of self-confidence. This research employed a quantitative approach with a quasi-experimental method using a nonequivalent posttest-only control group design. The study was conducted at SMP Negeri 1 Sape in the 2025/2026 academic year. The sample consisted of 55 eighth-grade students selected through cluster random sampling, comprising 29 students in the experimental class and 26 students in the control class. The research instruments included a critical thinking skills test and a self-confidence questionnaire using a 1–4 Likert scale. Data analysis was carried out using the Mann-Whitney test and Kruskal-Wallis test. The results showed that students taught using the Realistic Mathematics Education approach achieved higher critical thinking skills compared to students taught using conventional learning. The Mann-Whitney test yielded a significance value of 0.001 ($p < 0.05$), indicating a significant difference between the two groups. Furthermore, the Kruskal-Wallis test on self-confidence categories produced a significance value of 0.827 ($p > 0.05$), indicating that self-confidence independently did not significantly affect students' critical thinking skills. However, the interaction test between learning approach and self-confidence showed a significance value of 0.005 ($p < 0.05$), indicating a significant interaction between the learning approach and self-confidence toward students' critical thinking skills. The findings imply that the Realistic Mathematics Education approach is effective in improving students' mathematical critical thinking skills, particularly when combined with appropriate affective support such as self-confidence.

Keywords: Realistic Mathematics Education; Critical Thinking; Self-Confidence; Mathematics-Learning; Statistics.

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1. INTRODUCTION

Education plays a strategic role in national development, as a country's level of progress is largely determined by the quality of its education. In the era of the Fourth Industrial Revolution, the rapid advancement of science and technology demands that Indonesia's human resources

possess a high level of competitiveness to be able to compete with other nations on a global scale (Syafitri et al., 2021). In line with these demands, 21st-century education emphasizes the importance of developing higher-order thinking skills (HOTS) in students. One of the key components of HOTS that needs to be developed through the learning process is critical thinking. Critical thinking is a higher-order thinking skill that fosters students' analytical abilities in a deep and reflective manner (Hasanah et al., 2023). This aligns with the view (Juliani & Erita, 2023) that critical thinking falls under higher-order thinking skills, which require logical and reflective thinking processes. Furthermore, critical thinking in mathematics is a foundational competency that must be developed starting from elementary education, as it focuses not only on mastering mathematical concepts but also encompasses an individual's ability to analyze quantitative data, evaluate various problem-solving alternatives, and apply them adaptively in daily life (Wicaksana et al., 2025). According to Angelo, indicators of critical thinking skills include analyzing, synthesizing, problem-solving, drawing conclusions, and evaluating. Critical thinking skills play a vital role in helping students process information logically, reflectively, and systematically so that they can make decisions and solve problems, both in academic contexts and in daily life (Hikayat et al., 2020).

In the field of mathematics education, critical thinking is essential for understanding concepts, evaluating procedures, and developing contextual problem-solving strategies (Sari & Juandi, 2023). However, in reality, students' mathematical critical thinking skills in Indonesia remain relatively low. This is reflected in the results of the 2022 Programme for International Student Assessment (PISA) survey, which showed that Indonesian students' mathematics achievement ranked 68th out of 81 countries with an average score of 366, still far below the OECD average of 472 (OECD, 2022). Research in Indonesia itself indicates that many students still fail to meet the comprehensive indicators of critical thinking skills (Mardliyah et al., 2024). The connection becomes increasingly clear because the mathematics questions in PISA indeed require critical thinking skills to solve them (Nursidrati et al., 2022). This low level of critical thinking is also evident in statistics education, as this subject requires students to interpret data, analyze information, and draw conclusions based on available data (Prastini et al., 2022). Therefore, a learning process is needed that trains students to think logically, analytically, and reflectively when solving mathematical problems. One area of mathematics that can be used to develop these skills is statistics. Statistics is a field of study both pure and applied that examines methods for collecting, processing, presenting, analyzing, and interpreting numerical data to reduce uncertainty in drawing conclusions (Zurfadly et al., 2025). Statistics is generally taught in junior high and high school. In junior high school, statistics instruction covers measures of central tendency, which consist of the mean, median, and mode.

Based on interviews with mathematics teachers and preliminary observations at SMP Negeri 1 Sape, it was found that most students still struggle to analyze statistics problems, tend to memorize formulas, and lack confidence in presenting their answers. This situation aligns with previous research indicating that students still struggle to understand and analyze statistics problems, even though statistics is a crucial component of mathematics education in junior high schools (SMP/MTs) because it helps students understand data processing and analysis in daily life and develops their ability to communicate mathematical ideas through graphs, tables, diagrams, and symbols (Juliana & Hidayat, 2021). Additionally, the results of a preliminary study (Azizah, 2019) conducted at a public junior high school in Yogyakarta indicated that there are still students with low self-confidence, as evidenced by 41.94% or 13 students falling into the low category. Students' low self-confidence is suspected to be influenced by a learning process that still tends to emphasize memorization and procedural skills, even though the school has implemented a scientific approach as well as Problem-Based Learning and Discovery Learning models. As a result, discussion, collaboration, and the exchange of ideas among students remain limited, so students' opportunities to develop critical thinking skills through analysis, questioning, and reflection have not yet developed optimally (Fajra et al., 2023). Therefore, a learning approach is needed that can create meaningful and contextual learning processes to help students develop critical thinking skills, one of which is through the Realistic Mathematics Education (RME)

approach. According to (Rachmatia et al., 2024), Realistic Mathematics Education provides students with the opportunity to reconstruct their mathematical understanding through the resolution of contextual problems designed by teachers. In line with this, (Nurhayanti et al., 2022) state that Realistic Mathematics Education utilizes students' real-world experiences as a starting point in the process of mathematization through problem-solving activities, discussions, and collaboration. Through this process, students not only gain a deeper understanding of mathematical concepts but also become accustomed to analyzing problems, expressing opinions, and drawing logical conclusions.

In addition to cognitive factors, success in mathematics learning is also influenced by affective factors, one of which is self-confidence. Self-confidence is an affective component that plays a crucial role in students' mathematics learning process (Khoirunnisa & Rahayu, 2025). This indicates that self-confidence is not only related to an individual's psychological aspects but also influences students' engagement and success in the learning process. This is because self-confidence plays a crucial role in determining students' willingness to ask questions, express opinions, try problem-solving strategies, and persevere when facing difficulties (Septyana et al., 2024). However, many students still exhibit low self-confidence, leading them to be passive in the learning process (C. M. Lubis et al., 2019). Low self-confidence in these students can reduce their motivation to achieve academic success; therefore, learning efforts are needed to foster perseverance, high motivation, and strong self-confidence in solving mathematical problems (Hajar & Minarti, 2019). Consequently, enhancing students' self-confidence must be a priority in every learning process so that they become more active, independent, and confident in critically solving mathematical problems.

Research conducted by (Toruan et al., 2024) shows that the Realistic Mathematics Education (RME) approach is capable of improving students' mathematical critical thinking skills compared to conventional learning. Furthermore, (R. Lubis et al., 2024) state that the Realistic Mathematics Education approach has been proven to have a positive and significant impact on improving students' mathematical critical thinking skills. Additionally, (Delina et al., 2018) note that students learning through the Realistic Mathematics Education approach exhibit higher self-confidence compared to those in conventional learning settings. This demonstrates the effectiveness of Realistic Mathematics Education in improving the quality of students' mathematics learning in schools.

Although various studies have proven that the Realistic Mathematics Education (RME) approach has a positive effect on students' critical thinking skills and self-confidence, research examining the influence of Realistic Mathematics Education on critical thinking skills in terms of students' self-confidence levels in eighth-grade statistics material remains limited. Therefore, this study aims to analyze the effect of using Realistic Mathematics Education (RME) on critical thinking skills as viewed from students' self-confidence.

2. METHODS

This study employed a quantitative approach using a quasi-experimental method, specifically a nonequivalent posttest-only control group design. The study was conducted at SMP Negeri 1 Sape during the 2025/2026 academic year. The study population consisted of all eighth-grade students at SMP Negeri 1 Sape. The research sample consisted of 55 students selected using cluster random sampling, comprising 29 students in the experimental class and 26 students in the control class. The instruments used in this study were a critical thinking skills test adapted from a study by (Fauziyyah & Nurjanah, 2024) and a self-confidence questionnaire with a 1–4 scale adapted from a study by (Pratiwi, 2018). Data analysis in this study was conducted using nonparametric statistics, namely the Mann-Whitney Test and the Kruskal-Wallis Test. The Mann-Whitney Test was used because the posttest data were not normally distributed and consisted of two independent groups, namely the experimental class and the control class. Meanwhile, the Kruskal-Wallis test was used to determine differences in critical thinking ability based on students' self-confidence categories as well as the interaction between the learning approach and self-confidence, since the data consisted of more than two categories.

3. RESULT AND DISCUSSION

In accordance with the objectives of this study, several research questions were formulated as the main focus of the investigation. The first question concerns the differences in critical thinking skills between students who received instruction using Realistic Mathematics Education and those who received instruction using conventional methods. The Mann-Whitney test was used to compare these two independent groups because the data were not normally distributed.

To answer the second research question, the Kruskal-Wallis test was used to compare more than two groups with data that were not normally distributed. Specifically, this analysis examined differences in students' critical thinking skills based on their level of self-confidence. The following is a detailed description of the findings of this study.

3.1 Differences in Critical Thinking Skills Based on Learning Approaches

The Realistic Mathematics Education learning approach and conventional learning were implemented in different classrooms to evaluate differences in students' critical thinking skills between the two learning groups.

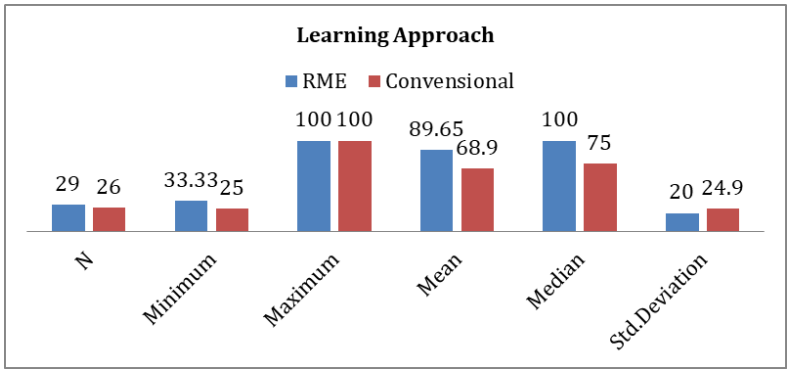

Figure 1. Presents The Differences In Students' Critical Thinking Skills Based on The Learning Approach Used.

As shown in **Figure 1**, the descriptive analysis indicates that the critical thinking skills of students in the experimental class, who underwent instruction using the Realistic Mathematics Education approach, showed an average score of 89.65 and a median of 100. In contrast, the control class, which received conventional instruction, showed an average score of 68.90 and a median of 75. This indicates that, overall, students in the experimental class had critical thinking skills that were approximately 20.75 points higher than those in the control class based on each class's average score. The score range for the experimental class was between 33.33 and 100, while the control class ranged from 25 to 100. This difference indicates that although the control class had lower critical thinking skills compared to the experimental class, there were also students who achieved high critical thinking scores, just like in the experimental class.

The analysis results show that the standard deviation in the Realistic Mathematics Education group was 20.00, while in the conventional group it was 24.90. This indicates that the data dispersion in the Realistic Mathematics Education group was smaller than in the conventional group, meaning student learning outcomes in the Realistic Mathematics Education group were more homogeneous. Conversely, the conventional group had greater score variation, indicating a wider range of student ability levels.

To support the descriptive analysis, hypothesis testing was conducted using statistical methods. The non-parametric statistical analysis used in this study was the Mann-Whitney test. The analysis results were obtained using SPSS software, as presented in **Figure 2** below.

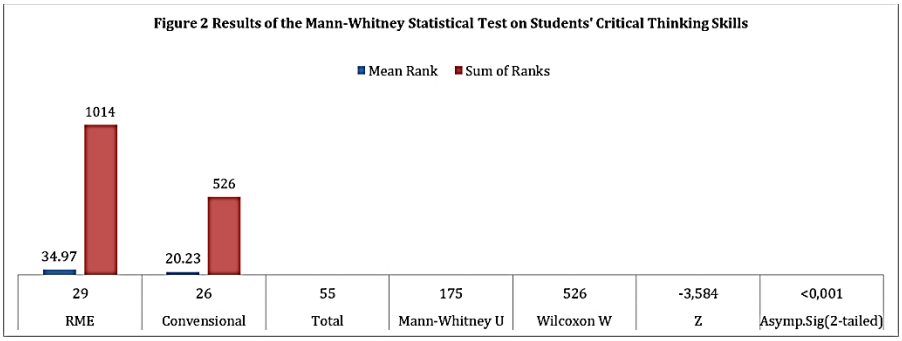

Figure 2. Results of the Mann-Whitney Statistical Test on Students' Critical Thinking Skills

The Mann-Whitney test was conducted to assess differences in critical thinking skills between students learning through the Realistic Mathematics Education approach and those learning through the conventional approach. The Mann-Whitney test -Whitney test yielded a U-value of 175.000 with a Z-score of -3.584 and a significance level of 0.001 ($p < 0.05$), indicating a statistically significant difference between the two groups namely, the group learning with the Realistic Mathematics Education approach (N = 29) and the group learning with the conventional approach in terms of critical thinking skills.

These findings align with the study by (Apriyani & Sujadi, 2015), which stated that students' critical thinking skills are better developed in learning with the Realistic Mathematics Education (RME) approach compared to conventional learning. The study by (Ainun Siti Fadilah & Lukman Hakim, 2022) also showed that the Realistic Mathematics Education approach is more effective in enhancing students' critical thinking skills. Furthermore, studies by (Toruan et al., 2024) and (Ulaimi et al., 2021) indicate that instruction using the Realistic Mathematics Education (RME) approach yields greater improvements in mathematical critical thinking skills compared to conventional instruction. Thus, the results of this study suggest that the Realistic Mathematics Education (RME) approach can serve as an effective alternative instructional method for enhancing students' mathematical critical thinking skills.

3.2 Differences in Critical Thinking Skills Based on Levels of Self-Confidence

This study examines the significance of self-confidence as a key factor in determining academic success, particularly in the context of students' critical thinking skills. Figure 4 presents a descriptive analysis showing clear differences in students' critical thinking skills based on the learning approach used. However, critical thinking skills based on self-confidence levels show the opposite trend. Students' critical thinking skills do not depend on their level of self-confidence, as shown in **Figure 3** and **Figure 4**.

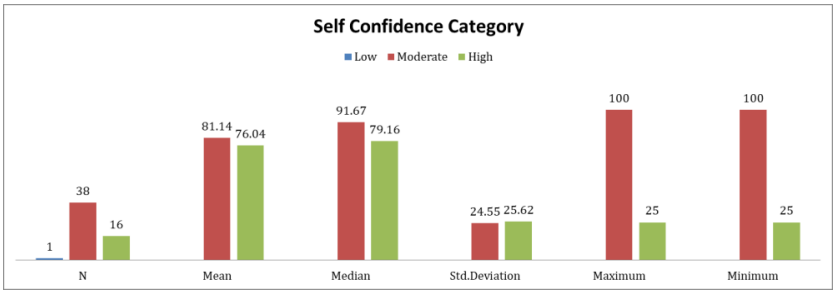

Figure 3. Descriptive Analysis of Students' Critical Thinking Skills Based on Self-Confidence Categories

Students in the high category (N=16) achieved an average score of 76.04, with a minimum score of 25, a maximum score of 100, and a standard deviation of 25.62. This indicates that students with high self-confidence do not necessarily possess high critical thinking skills, meaning that the relationship between self-confidence and critical thinking skills is not linear (it does not always increase in tandem).

In the group of students in the moderate category (N=38), the average score was 81.14, with a minimum score of 25 and a maximum of 100, and a standard deviation of 24.55. This indicates that students' abilities in this category are not uniform; that is, students with moderate self-confidence do not always possess moderate critical thinking skills—ranging from very low to very high. At the same time, the low category (N=1) did not appear or was not analyzed because the data in this group showed no variation (constant). This indicates that there was only one student in the low category, so SPSS could not calculate complete descriptive statistics.

Overall, it can be concluded that students' critical thinking skills in the moderate self-confidence category tend to be higher than those in the high category. However, the high standard deviation in both categories indicates that students' abilities vary significantly, so the relationship between self-confidence and critical thinking skills is not linear.

Furthermore, to reinforce the results of the descriptive analysis above, a non-parametric test, specifically the Kruskal-Wallis test, was used in this study to determine whether there are differences in students' critical thinking abilities based on self-confidence categories. The analysis results were obtained using SPSS software, as shown in **Figure 4.**

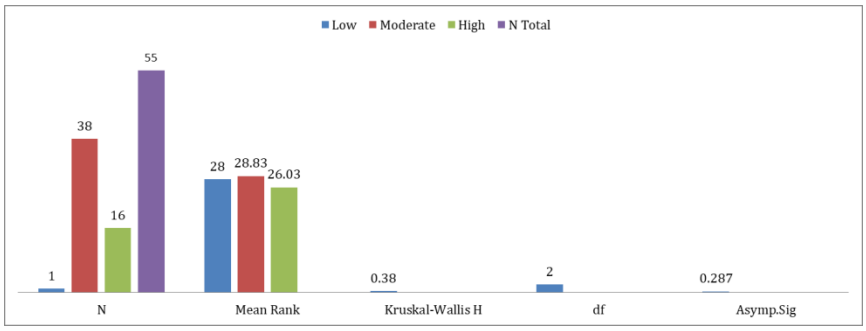

Figure 4. Kruskal-Wallis Test of Students' Critical Thinking Skills by Self-Confidence Category

The results of the statistical test show that the Kruskal-Wallis value is H=0.380 with a degrees of freedom (df) of 2 and an asymptotic significance level (Asympt. Sig.) of 0.827. Given that the significance value ($p > 0.05$) is greater than the predetermined significance level, it can be statistically concluded that there is no substantial difference in critical thinking ability based on self-confidence levels. Independently, self-confidence does not show a significant influence on students' critical thinking ability. This indicates that mathematical critical thinking ability is influenced not only by self-confidence but also by other factors such as learning motivation, Self-Regulated Learning (SRL), learning strategies, and student engagement during the learning process. Furthermore, high self-confidence does not always correlate with high critical thinking ability. Some students with high self-confidence may not necessarily be able to conduct in-depth analysis and evaluation when solving mathematical problems.

These findings align with those of (Rohmat & Lestari, 2019), who stated that self-confidence does not have a significant influence on students' mathematical critical thinking skills. Research by (Isnaini, 2024) also indicates that learning motivation influences students' critical thinking skills. Additionally, (Roslinda et al., 2022) state that Self-Regulated Learning (SRL) skills play a role in helping students manage the learning process to achieve learning objectives. However, this study differs from the findings of (Septyana et al., 2024), which indicate that students with high self-confidence tend to meet more indicators of critical thinking ability compared to those with moderate or low self-confidence. These differing results indicate that the influence of self-confidence on critical thinking skills can be affected by learning conditions, student characteristics, and other supporting factors. Thus, the results of this study show that differences in students' levels of self-confidence have not yet had a significant effect on their mathematical critical thinking skills. Therefore, efforts to improve critical thinking skills should not only focus on strengthening self-confidence but also consider affective factors and other learning processes.

3.3 The Interaction Between Learning Approaches and Self-Confidence

This study aims to determine how the interaction between learning approaches and self-confidence levels influences students' critical thinking skills. The results of this study are expected to serve as a basis for developing learning strategies tailored to students' self-confidence characteristics. **Figure 5** shows variations in students' critical thinking skills based on the interaction between the learning approaches used (Realistic Mathematics Education and conventional) and students' self-confidence levels.

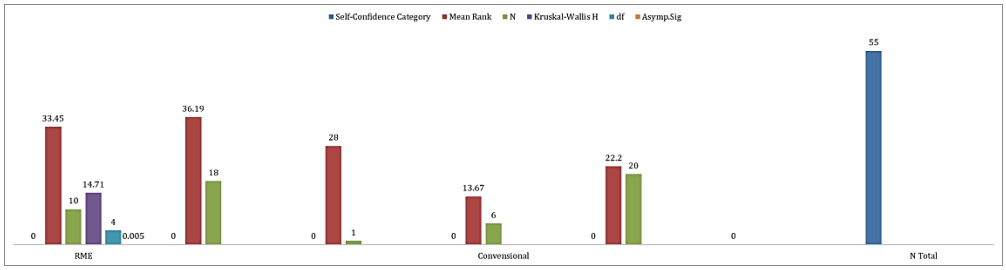

Figure 5. Statistical Analysis of Critical Thinking Skills Based on Learning Approaches and Self-Confidence Categories

Based on the statistical results regarding Critical Thinking Skills by Learning Approach and Self-Confidence Category presented in **Figure 5** above, students who used the Realistic Mathematics Education approach and had a moderate level of self-confidence (N=18) achieved a mean rank score of 36.19. Conversely, students who used the conventional approach with moderate self-confidence (N=20) achieved a mean rank score of 22.20. This empirical evidence indicates that students using the Realistic Mathematics Education approach with moderate self-confidence exhibit the highest tendency for critical thinking skills compared to other groups. This finding is supported by interview results (Maulidya & Nugraheni, 2021), which indicate that students with moderate self-confidence tend not to view math problems as overly difficult and continue to strive to understand the problem's meaning and seek solutions even while facing challenges in comprehending the modified problems. This indicates that even though students with moderate self-confidence face difficulties in understanding problems, active engagement in Realistic Mathematics Education can help them develop critical thinking skills more effectively when attempting to solve problems, even if they have not yet fully mastered the underlying concepts.

Additionally, students with low self-confidence who learned using the Realistic Mathematics Education approach also achieved a higher mean rank compared to students in conventional learning. This finding is supported by (Nugraha & Widiati, 2023), who state that although students with low self-confidence still face difficulties in formulating the core of a problem, determining the consequences of a decision, and generalizing problem-solving strategies, some students have been able to analyze solution steps for certain problems, suggesting that contextual and active learning approaches like Realistic Mathematics Education can help students understand and explore problem-solving in a more gradual manner. This indicates that the Realistic Mathematics Education approach provides students with opportunities to be more actively engaged in the learning process, thereby helping to enhance their self-confidence in solving mathematical problems. This aligns with the findings (Delina et al., 2018) stating that students using the Realistic Mathematics Education approach exhibit higher self-confidence than those using conventional instruction.

To strengthen the results of the descriptive analysis, a Kruskal-Wallis test was conducted to determine the significance of differences in critical thinking ability based on the interaction between the instructional approach and self-confidence. The test results in **Figure 5** above indicate a significant difference in students' critical thinking skills based on the combination of these two factors ($p < 0.05$). This finding suggests that students' critical thinking skills are

influenced not only by the learning approach but also by their level of self-confidence and the interaction between the two.

These findings are supported by previous research indicating that the implementation of the Realistic Mathematics Education approach using the Think Talk Write (TTW) cooperative learning model can enhance students' self-confidence and mathematical problem-solving skills (Ningrum & Rejeki, 2023). The increase in self-confidence observed in each learning cycle indicates that Realistic Mathematics Education learning provides students with opportunities to engage more actively in discussions, express their opinions, and explore problem-solving independently. These conditions can help students develop higher-order thinking skills, including mathematical critical thinking.

The results of this study also align with the findings of (Rizqi et al., 2018) who state that the implementation of the Realistic Mathematics Education approach, supported by strong self-confidence, can help students tackle challenges in mathematics learning. Additionally, (Laurens et al., 2018) revealed that Realistic Mathematics Education is effective in enhancing students' motivation, self-confidence, problem-solving skills, and reasoning abilities, which contribute to improvements in their cognitive performance. These findings are reinforced by (Asdar et al., 2021), who state that students using the Realistic Mathematics Education approach exhibit higher self-confidence compared to those using conventional approaches.

Based on these results, it can be concluded that self-confidence alone is insufficient to explain differences in students' critical thinking abilities. However, when self-confidence is combined with an appropriate learning approach, such as Realistic Mathematics Education, students' critical thinking skills can develop more optimally. Therefore, mathematics teachers need to implement contextual and student-centered learning approaches to develop mathematical critical thinking skills while simultaneously enhancing students' self-confidence so they can be more active in discussions, express their opinions, and solve mathematical problems independently.

4. CONCLUSION

Based on the results of the research and data analysis conducted, it can be concluded that the Realistic Mathematics Education (RME) approach has a significant effect on students' mathematical critical thinking skills. This is evident in the results of the Mann-Whitney test, which indicate a significant difference between students learning using the Realistic Mathematics Education approach and those using conventional instruction, with a significance level of Descriptively, students in the experimental class achieved a higher average score in mathematical critical thinking compared to the control class. Additionally, the distribution of scores in the Realistic Mathematics Education class was more homogeneous than in the conventional class. These findings indicate that the Realistic Mathematics Education approach is capable of creating a more effective learning process in developing students' mathematical critical thinking skills through contextual activities, discussions, and active concept construction.

Furthermore, the research results indicate that self-confidence, when considered independently, does not have a significant effect on students' mathematical critical thinking skills. This is evidenced by the results of the Kruskal-Wallis test with a significance level of . Although descriptively, students in the moderate self-confidence category achieved a higher average in mathematical critical thinking ability compared to the high category, this difference was not statistically significant. This finding indicates that students' mathematical critical thinking ability is influenced not only by self-confidence but also by other factors such as learning motivation, Self-Regulated Learning (SRL), learning strategies, and student engagement during the learning process.

Furthermore, the research results also indicate an interaction between the learning approach and self-confidence on students' mathematical critical thinking skills. The Kruskal-Wallis test results for the group combinations showed a significance value of , indicating that there are differences in critical thinking skills across combinations of learning approaches and students' self-confidence levels. The group of students learning using the Realistic Mathematics Education approach with moderate self-confidence achieved the highest mean rank compared to the other

groups. These findings suggest that self-confidence alone is insufficient to explain students' critical thinking abilities; however, when combined with an appropriate learning approach such as Realistic Mathematics Education, students' critical thinking abilities can develop more effectively. Thus, the Realistic Mathematics Education approach can serve as an effective learning alternative for enhancing students' mathematical critical thinking abilities while taking into account students' affective characteristics, particularly self-confidence.

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REFERENCES

Fadilah, A.S. N., & Lukman Hakim, D. (2022). *Efektivitas pembelajaran realistic mathematics education (RME) terhadap kemampuan berpikir kritis siswa SMP*. *Jurnal Ilmiah Wahana Pendidikan, 8*(22), 567–575. https://doi.org/10.5281/zenodo.7357396

Apriyani, D., & Sujadi, A. A. (2015). *Efektivitas pembelajaran matematika dengan pendekatan matematika realistik Indonesia terhadap kemampuan berpikir kritis ditinjau dari motivasi belajar siswa kelas VII SMP Negeri 3 Pandak tahun ajaran 2013/2014*. *UNION: Jurnal Ilmiah Pendidikan Matematika, 3*(3), 317–326. https://doi.org/10.30738/.v3i3.390

Asdar, Arwadi, F., & Rismayanti. (2021). *Pendekatan pendidikan matematika realistik terhadap hasil belajar matematika dan self confidence siswa SMP*. *PLUSMINUS: Jurnal Pendidikan Matematika, 1*(1), 1–16.

Azizah, I. N. (2019). *Keefektifan pembelajaran berbasis proyek ditinjau dari prestasi belajar, kemampuan berpikir kritis, dan kepercayaan diri siswa*. *Jurnal Riset Pendidikan Matematika, 6*(2), 236–249. https://doi.org/10.21831/jrpm.v6i2.15927

Delina, Afrilianto, M., & Rohaeti, E. E. (2018). *Kemampuan berpikir kritis matematis dan self confidence siswa SMP melalui pendekatan realistic education*. *Jurnal Pembelajaran Matematika Inovatif, 1*(3), 281–288. https://doi.org/10.22460/jpmi.v1i3.281-288

Fajra, R., Syachruroji, A., & Rokmanah, S. (2023). *Metode pembelajaran aktif untuk meningkatkan keterampilan berpikir kritis siswa sekolah dasar*. *Jurnal Dunia Pendidikan, 4*(1), 123–130.

Fauziyyah, F., & Nurjanah. (2024). *Eksplorasi penggunaan game edukasi dalam pembelajaran statistika untuk mengembangkan kemampuan berpikir kritis siswa SMP* [Undergraduate thesis, Universitas Pendidikan Indonesia]. *PHI: Jurnal Pendidikan Matematika, 8*(2). https://doi.org/10.33087/phi.v8i2.407

Hajar, M. S., & Minarti, E. D. (2019). *Pengaruh self confidence siswa SMP terhadap kemampuan berpikir kritis matematis*. *Majamath, 2*(1), 1–10.

Hasanah, M., Zulmaidar Puurba Silangi, S., Putriani Jamil, R., & Nur Amanda, W. (2023). *Analisis tingkat kemampuan berpikir kritis siswa SMA Nurul Iman Tanjung Morawa*. *PEDAGOGI: Jurnal Ilmiah Pendidikan, 9*(1), 17–24.

Hikayat, C., Suparman, Hairun, Y., & Suharna, H. (2020). Design of realistic mathematics education approach to improve critical thinking skills. *Universal Journal of Educational Research, 8*(6), 2232–2244. https://doi.org/10.13189/ujer.2020.080606

Isnaini, Z. (2024). *Hubungan self confidence dan motivasi belajar terhadap kemampuan bepikir kritis serta dampaknya pada penalaran adaptif peserta didik* [Undergraduate thesis, Universitas Islam Negeri Raden Intan Lampung].

Juliana, H. S., & Hidayat, W. (2021). *Analisis kesalahan siswa MTs kelas VIII di Bandung Barat pada materi statistika*. *JPMI, 4*(5), 1357–1364. https://doi.org/10.22460/jpmi.v4i5.1357-1364

Juliani, R. P., & Erita, S. (2023). *Analisis validitas dan reliabilitas instrumen penilaian kemampuan berpikir kritis dalam konteks sekolah menengah*. *Journal of Educational Integration and Development, 3*(3), 170–178.

Khoirunnisa, M., & Rahayu, W. (2025). Systematic literature review: Self confidence. *De Fermat: Jurnal Pendidikan Matematika, 8*(1), 370–380.

Laurens, T., Batlolona, F. A., Batlolona, J. R., & Leasa, M. (2018). How does realistic mathematics education (RME) improve students' mathematics cognitive achievement? *EURASIA Journal of Mathematics, Science and Technology Education, 14*(2), 569–578. https://doi.org/10.12973/ejmste/76959

Lubis, C. M., Rajagukguk, W., & Fauzi, K. M. A. (2019). *Perbedaan self confidence siswa melalui pembelajaran pendidikan matematika realistik dan pembelajaran berbasis masalah*. *Paradikma Jurnal Pendidikan Matematika, 12*(1), 1–3.

Lubis, R., Marbun, Y. M. R., & Pangaribuan, F. (2024). *Pengaruh pendekatan pembelajaran matematika realistik terhadap kemampuan berpikir kritis matematika siswa pada materi bangun ruang sisi datar kelas VIII SMP*. *Innovative: Journal of Social Science Research, 4*(1), 835–845.

Mardliyah, S., Herman, T., & Febrianti, E. D. (2024). *Analisis kemampuan berpikir kritis matematis siswa SMP kelas VIII*. *Teorema: Teori dan Riset Matematika, 9*(1), 130–140.

Maulidya, N. S., & Nugraheni, E. A. (2021). *Analisis hasil belajar matematika peserta didik ditinjau dari self confidence*. *Jurnal Cendekia: Jurnal Pendidikan Matematika, 5*(3), 2590–2599. https://doi.org/10.31004/cendekia.v5i3.903

Ningrum, S. A. U., & Rejeki, S. (2023). Improving students' self-confidence and problem-solving ability through RME approach with TTW type cooperative learning model setting. *Numerical: Jurnal Matematika dan Pendidikan Matematika, 7*(1), 153–164.

Nugraha, K. Z., & Widiati, I. (2023). *Analisis kemampuan berpikir kritis peserta didik ditinjau dari self-confidence*. *Journal of Didactic Mathematics, 4*(3). https://doi.org/10.34007/jdm.v4i3.1979

Nurhayanti, H., Hendar, H., & Kusmawati, R. (2022). *Model realistic mathematic education dalam meningkatkan pemahaman konsep matematika pada materi pecahan*. *Jurnal Tahsinia, 3*(2), 160–170. https://doi.org/10.57171/jt.v3i2.334

Nursidrati, L. I., Komalasari, L. I., & Syamratulangi, S. (2022). *Analisis penyajian konsep fungsi pada buku teks matematika Singapura dalam mengembangkan berpikir kritis*. *Jurnal LENTERA: Jurnal Studi Pendidikan, 4*(2), 1–10. https://doi.org/10.51518/lentera.v4i2.69

OECD. (2022). *PISA 2022 results*. https://www.oecd.org/content/dam/oecd/en/publications/reports/2023/11/pisa-2022-results-volume-i-and-ii-country-notes_2fca04b9/indonesia_0e09c072/c2e1ae0e-en.pdf

Pratiwi, S. (2018). *Pengaruh prestasi belajar terhadap kepercayaan diri siswa di Sekolah Menengah Pertama Negeri 2 Mlati* [Undergraduate thesis, Universitas Negeri Yogyakarta].

Prastini, P.T, A., Ika Purwaningsih, W., & Maryam, I. (2022). *Analisis berpikir kritis matematis siswa SMP pada materi statistika*. *Jurnal Karya Pendidikan Matematika, 9*(1), 87–95.

Rachmatia, M., Wahyu Nengsih, L., Mesra, R., Effendi, H., Robert Tuerah, P., Ayu Widyaningrum, D., Masruro Nasution, Z., Anggraini, F., Igolois Grenga Uran, S., Okta Kirana, I., & Saddia, A. (2024). *Pembelajaran berbasis HOTS: Konsep dan implementasi* (1st ed.). PT Mifandi Mandiri Digital.

Rizqi, H. Y., Waluya, S. B., & Wiyanto. (2018). *Penerapan self-confidence dan realistic mathematics education (RME) terhadap peningkatan kemampuan komunikasi matematis*. In *Seminar Nasional Pendidikan Matematika Ahmad Dahlan*.

Rohmat, A. N., & Lestari, W. (2019). *Pengaruh konsep diri dan percaya diri terhadap kemampuan berpikir kritis matematis. Jurnal Kajian Pendidikan Matematika, 5*(1), 82–90.

Roslinda, F., Sulistyaningsih, D., & Suprapto, R. (2022). *Pengaruh self-regulated learning terhadap kemampuan berpikir kritis matematis siswa*. *Prosiding Seminar Nasional UNIMUS, 5*, 678–685.

Sari, R. N., & Juandi, D. (2023). Improving student's critical thinking skills in mathematics education: A systematic literature review. *Jurnal Cendekia: Jurnal Pendidikan Matematika, 7*(1), 845–856. https://doi.org/10.31004/cendekia.v7i1.2091

Septyana, N., Sumaji, & Wanabuliandari, S. (2024). *Analisis kemampuan berpikir kritis matematis siswa SMP ditinjau dari self confidence*. *Jurnal Riset HOTS Pendidikan Matematika, 4*(3), 1392–1402. https://doi.org/10.51574/kognitif.v4i3.1983

Syafitri, E., Armanto, D., & Rahmadani, E. (2021). *Aksiologi kemampuan berpikir kritis*. *Journal of Science and Social Research, 4*(3), 320–329.

Toruan, H. L., Simamora, R. E., & Rahayu, S. W. (2024). *Efektivitas realistic mathematics education terhadap berpikir kritis matematis siswa kelas VII sekolah menengah pertama*. *Edu-Mat: Jurnal Pendidikan Matematika, 12*(2), 314–323.

Ulaimi, Muhammad, I., & Isfayani, E. (2021). *Penerapan pendekatan pendidikan matematika realistik (PMR) terhadap peningkatan kemampuan berpikir kritis matematis siswa Negeri 1 Dewantara*. *Pendidikan Matematika Malikussaleh, 1*(1), 55–63.

Wicaksana, L., Widiarti, N., & Subali, B. (2025). *Kajian pustaka: Realistic mathematics education terhadap kemampuan berpikir kritis siswa sekolah dasar*. *Jurnal Penelitian Pendidikan, 25*(2), 159–168.

Zurfadly, A., Prawinata, M. G., Miskal, Ipindi, R., Putra, M. A., Hasmawati, & Alfassa, A. I. (2025). *Mengenal ukuran pemusatan data dalam ilmu statistika dasar*. *Journal of Statistics Demography and Engineering (ALPHA), 1*(1), 50–58