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The Effectiveness of Differentiated Instruction with a Realistic Mathematics Education (RME) Approach in Terms of Mathematical Literacy and Self-efficacy of Junior High School Students on the Topic of Systems of Linear Equations in Two Variables

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Abstract

The purpose of this study is to describe the effectiveness of differentiated instruction using the Realistic Mathematics Education (RME) approach in terms of students' mathematical literacy and self-efficacy in two experimental classes: experimental class 1 (slow learners) and experimental class 2 (fast learners). Additionally, this study aims to identify which class demonstrates greater effectiveness in implementing differentiated instruction with the RME approach. In this study, differentiated instruction was applied by grouping students based on their interests, while the RME approach was used to design the mathematics learning activities in class. This study employed a quasi-experimental method with a non-equivalent pretest-posttest group design. The research was conducted at private junior high school in Sleman between January and February 2025. The population consisted of all eighth-grade students at the school during the second semester of the 2024/2025 academic year. The classes were selected based on the research objective—to compare slow learners and fast learners—as well as recommendations from the school's mathematics teacher. The selected sample consisted of class VIII A (slow learners) as experimental class 1 and class VIII C (fast learners) as experimental class 2. Data collection instruments included lesson implementation observation sheets, pretests and posttests for mathematical literacy, and a student self-efficacy questionnaire. Prior to implementation, all instruments were tested in a class not included in the main study. The results indicated that all instruments were valid and reliable, meaning they were suitable for use in this research. The statistical analyses used included Pillai's Trace test to determine differences in the mean vectors between two independent samples, followed by an independent samples t-test. The results of the study showed that the implementation of differentiated instruction with the RME approach in experimental class 1 was not effective in terms of students' mathematical literacy, but it was effective in terms of self-efficacy. In contrast, in experimental class 2, the implementation was effective in terms of both mathematical literacy and self-efficacy. Furthermore, the study indicated that differentiated instruction with the RME approach was more effective when implemented in the fast learner class (experimental class 2) compared to the slow learner class (experimental class 1), in terms of both mathematical literacy and self-efficacy. Future research is recommended to explore other types of differentiation and different student characteristics to broaden the scope of differentiated instruction implementation.

Keywords: *Differentiated Instruction, RME, Mathematical Literacy, Self-Efficacy, Slow Learner, Fast Learner*

Introduction

The learning paradigm in 21st-century education emphasizes that students must develop higher-order thinking skills, including critical thinking, the ability to connect knowledge with real-world problems, information literacy, technological communication, and collaboration skills (Kholid et al., 2022). In mathematics education, learning emphasizes the development of critical thinking and problem-solving skills, which are essential for meeting the demands of the modern workforce (Szabo et al., 2020). According to the Organisation for Economic Cooperation and Development (OECD), this is closely related to mathematical literacy, which focuses on the ability to apply mathematical knowledge in real-world contexts (OECD, 2022). Based on this perspective, mathematical literacy is one of the key competencies required in the 21st century. It includes a deep understanding of mathematics, such as abstract reasoning, generalization, and solving complex problems (OECD, 2022). According to the 2022 Programme for International Student Assessment (PISA) results, Indonesian students' average mathematical literacy score was 366—well below the OECD average of 472. Despite Indonesia rising five places in the overall PISA rankings compared to 2018, the mathematical literacy score declined by 13 points, from 379 in 2018 to 366 in 2022.

The indicators assessed by PISA 2022 for mathematical literacy include formulating, employing, and interpreting mathematics in real-world contexts (OECD, 2022). One topic directly related to real-life contexts is the system of linear equations in two variables (SPLDV), which is highly relevant to these indicators. However, students often struggle with this topic due to a lack of interest and limited ability to comprehend, process, and solve problems (Ernawati & Muzaini, 2020). Additionally, students face difficulties in converting word problems into mathematical equations and correctly formulating linear equations (Pradini & Winarsih, 2020). Other common errors in solving SPLDV problems include incorrect use of mathematical ideas, misunderstanding topics, and computational mistakes (Laia, 2024). The SPLDV topic plays a crucial role in enhancing students' mathematical literacy, as it is closely linked to everyday problem-solving—a central focus of mathematical literacy.

Sulfayanti (2023) found that students' low mathematical literacy is influenced by both external and internal factors. External factors include instructional models, teaching materials, and learning environments, while internal factors encompass prior knowledge, self-confidence, and interest. Instruction that solely emphasizes problem-solving procedures is insufficient to improve students’ mathematical literacy (Kusmaryono & Kusumaningsih, 2023). The study further suggests that mathematics instruction needs to be redesigned to incorporate more interactive and real-world problem-based approaches. Individual differences in students’ learning abilities pose a significant challenge to implementing interactive, real-world problem-based learning. Some students are categorized as slow learners, while others are fast learners. To accommodate these differences, instruction must be adapted to meet the diverse needs of students. Differentiated instruction is one approach that allows such accommodation.

Differentiated instruction is a teaching approach that emphasizes the adaptation of methods, materials, or tasks to align with students’ learning preferences and interests (Tomlinson, 2001). The primary goal is to ensure that each student experiences learning tailored to their developmental level and interests (Tomlinson, 2001). Laine et al. (2020) emphasized the importance of student interest in learning, as students tend to be more motivated and better able to understand material when it aligns with their personal interests. Thus, interest-based differentiation becomes a key component of differentiated instruction.

Interest-based differentiated instruction offers meaningful learning experiences by integrating subject matter with real-life applications (Tomlinson, 2001). his principle aligns with the principles of Realistic Mathematics Education (RME), which emphasizes that mathematics should originate from real-life contexts. RME is seen as compatible with differentiated instruction because both utilize real-world problems as a foundation for learning, helping students better understand mathematical concepts

(Maulana, 2021). Moreover, differentiated instruction with the RME approach can accommodate diverse learning abilities, including those of slow and fast learners. This approach enables teachers to adjust task complexity, problem contexts, and the level of support according to students' readiness, interests, and learning profiles (Tomlinson, 1999). Through differentiation, slow learners can be given simpler contextual problems and intensive guidance, while fast learners can engage with more complex, open-ended, and exploratory tasks. RME is also highly flexible, emphasizing conceptual understanding of real-world contexts, student-led concept construction, and the use of models derived from students' experiences (Freudenthal, 1991).

Nugraha (2023) found that the implementation of differentiated instruction can improve mathematical literacy. Similarly, Taqiya & Juandi (2023) concluded that the RME approach positively impacts students' mathematical literacy. Jati et al. (2023) further noted that interest-based differentiated instruction using RME can enhance students' numeracy skills. Accordingly, this study aims to explore the effectiveness of differentiated instruction combined with the RME approach in improving junior high school students' self-efficacy and mathematical literacy in the topic of SPLDV.

Method

This study employed a quasi-experimental research design. Specifically, the design used was the nonequivalent pretest-posttest group design. The research was conducted at a private junior high school in Sleman, involving eighth-grade students. Data collection took place in the even semester of the 2024/2025 academic year, from January to February 2025. The sampling technique used in this study was purposive sampling. Two classes were selected as research samples based on the research objectives and recommendations from the school's mathematics teacher, who considered students' abilities in comprehending the subject matter. The selected sample classes were Class VIII A (slow learners) and Class VIII C (fast learners), both of which received the treatment of differentiated instruction integrated with the Realistic Mathematics Education (RME) approach. The classification of students' learning abilities was based on their semester report card grades and psychological test results.

The research instruments included a mathematical literacy test and a self-efficacy questionnaire. Before being used in the actual study, the instruments were piloted on a non-sample class. The results of the instrument trials indicated that the instruments were both valid and reliable. The data analysis techniques used in this study included effectiveness testing with the One-Sample t-Test, difference testing using Pillai's Trace test, and comparative testing using the Independent Sample t-Test.

Results and Discussion

Results

This study implemented differentiated instruction using the Realistic Mathematics Education (RME) approach in two experimental classes: Experimental Class 1 (slow learners) and Experimental Class 2 (fast learners). Differentiated instruction was used to group students based on their interests, while the RME approach was used to design the classroom learning activities. Both classes received the same instructional treatment—differentiated instruction integrated with RME. The distinction between the two groups lay in the students' learning abilities, as classified by the school. Interest differentiation in this study was based on the Indonesian Ministry of Education and Culture Regulation No. 12 of 2024 concerning local content, which emphasizes the integration of learning with local potential and uniqueness. According to the regulation, local content may be integrated into other subjects—in this case, mathematics. The categories of interest in this study included arts and culture, handicrafts, health, and technology.

Prior to conducting effectiveness, difference, and comparative tests, assumption tests were carried out, including multivariate normality, univariate normality, covariance homogeneity, and variance homogeneity. Multivariate normality was tested using Mardia's test, which assesses skewness and kurtosis of multivariate data. The results showed that the data were multivariate normal, as both skewness and kurtosis statistics yielded $p - value > 0{,}05$, indicating no significant deviation from normality.

Table 1. Result Normality Multivariate Mardia's Test

Test	Variable	Statistic	p-value	Notes
Mardia Skewness	Mathematical Literacy	1.11375	0.89208	Normal
Mardia Skewness	Self-efficacy	1.11375	0.89208	Normal
Mardia Kurtosis	Mathematical Literacy	0.59874	0.54934	Normal
Mardia Kurtosis	Self-efficacy	0.59874	0.54934	Normal

The results of the multivariate normality test presented in Table 1 indicate that the data are normally distributed. In the Mardia Skewness test, the obtained statistic was 1.1138 with a p-value of 0.8921 (> 0.05), indicating that there was no significant skewness in the multivariate data distribution. This suggests that the data do not exhibit distortion along the horizontal axis. In the Mardia Kurtosis test, the obtained statistic was -0.5987 with a p-value of 0.5493 (> 0.05), indicating no significant thinning or flattening of the distribution. Thus, the multivariate data distribution closely approximates a normal distribution. Based on these results, it can be concluded that the data in this study satisfy the assumption of multivariate normality.

Subsequently, a univariate normality test was conducted using the Shapiro–Wilk test at a significance level of α = 0.05. The results of the univariate normality test using the Shapiro–Wilk method are presented in the following table.

Table 2. Result Normality Univariate Shapiro Wilk's Test

Variable	Class	W Value	p-value	Notes
Pretest Mathematical Literacy	Experimental 1	0.89645	0.0593	Normal $(p > 0{,}05)$
Pretest Mathematical Literacy	Experimental 2	0.89661	0.0596	Normal $(p > 0{,}05)$
Posttest Mathematical Literacy	Experimental 1	0.91642	0.1284	Normal $(p > 0{,}05)$
Posttest Mathematical Literacy	Experimental 2	0.91019	0.1008	Normal $(p > 0{,}05)$
Pretest Self-efficacy	Experimental 1	0.94297	0.3551	Normal $(p > 0{,}05)$
Pretest Self-efficacy	Experimental 2	0.91524	0.1227	Normal $(p > 0{,}05)$
Posttest Self-efficacy	Experimental 1	0.95807	0.5955	Normal $(p > 0{,}05)$
Posttest Self-efficacy	Experimental 2	0.94128	0.0593	Normal $(p > 0{,}05)$

Based on Table 2, it can be concluded that all data—both pretest and posttest scores for the variables of mathematical literacy and self-efficacy—are normally distributed. The normality test employed in this study was the Shapiro–Wilk test, which yielded p-values greater than 0.05 for all experimental groups. This indicates that the data for both the pretest and posttest in all experimental groups are univariately normally distributed.

The next assumption test conducted was the test of covariance homogeneity. In this study, covariance homogeneity was tested using Box's M test with a significance level of α = 0.05. The results of the Box's M test are presented in the following table.

Table 3. Result Box M's Test

Notes	$chi-sq\ approx$	$p-value$
Pretest	8.7985	0.03209
Posttest	31.696	6.065×10^{-7}

The decision criterion for the Box's M test is that the null hypothesis (H_0) is rejected if the approximate chi-square value exceeds $\chi^2(0.05, 3) = 7.815$, or if the p-value is less than 0.05. Based on Table 3, the pre-treatment data yielded a chi-square approximation of 8.7985 > 7.815 with a p-value of 0.03209 < 0.05. Therefore, it can be concluded that H_0 is rejected. This implies that the covariances between groups are not homogeneous, meaning that the variance-covariance matrices of the pretest scores for mathematical literacy and self-efficacy in experimental class 1 are not equal to those in experimental class 2.

For the post-treatment data, Table 3 shows a chi-square approximation of 31.696 > 7.815 and a p-value of $6.065 \times 10^{-7} < 0.05$. Consequently, H_0 is also rejected. This indicates that the covariances between groups remain non-homogeneous, signifying that the variance-covariance matrices of the posttest scores for mathematical literacy and self-efficacy in experimental class 1 differ from those in experimental class 2.

The final assumption test conducted was the test of variance homogeneity. In this study, variance homogeneity was assessed using Levene's Test with a significance level of $\alpha = 0.05$. The results of Levene's Test are presented in the following table.

Table 4. Result Levene's Test

Notes	Variable	F value	$p-value$
Pretest	Mathematical Literacy	0.4187	0.5222
	Self-efficacy	0.0392	0.8443
Posttest	Mathematical Literacy	0.4732	0.4965
	Self-efficacy	1.4351	0.2397

The decision criterion for Levene's Test is that the null hypothesis (H_0) is rejected if the F-value exceeds $F_{0.05}(1,32) = 4.149$, or if the p-value is less than 0.05. Based on Table 23, the pre-treatment (pretest) data for the mathematical literacy variable yielded an F-value of 0.4187 < 4.149 and a p-value of 0.5222 > 0.05. Therefore, it can be concluded that H_0 is not rejected. This indicates that the population variances of the pretest scores for mathematical literacy in experimental class 1 and experimental class 2 are equal. For the self-efficacy variable prior to treatment, the F-value was 0.0392 < 4.149 and the p-value was 0.8443 > 0.05. Thus, H_0 is not rejected, indicating that the population variances for self-efficacy pretest scores in experimental class 1 and experimental class 2 are equal.

Regarding the posttest scores, the mathematical literacy variable yielded an F-value of 0.4732 < 4.149 and a p-value of 0.4965 > 0.05. Therefore, it can be concluded that H_0 is not rejected. This means that the population variances for posttest mathematical literacy scores in both experimental classes are equal. For the self-efficacy variable, the post-treatment F-value was 1.4351 < 4.149 and the p-value was 0.2397 > 0.05. Again, H_0 is not rejected, indicating that the population variances for posttest self-efficacy scores are equal between experimental class 1 and experimental class 2.

After conducting the prerequisite tests for normality and homogeneity of data—both for pretest and posttest—the next step was hypothesis testing. The first and second hypotheses concern the effectiveness of the implemented learning model in the classroom, and were tested by evaluating whether the post-intervention results met the predetermined effectiveness criteria. The criterion for determining the effectiveness of differentiated instruction with the RME approach in improving mathematical literacy was defined as a posttest score of 70 or higher (classified as moderate according to the school's KKTP standard). Meanwhile, the effectiveness criterion for improving self-efficacy was a posttest score of 53 or higher (moderate category according to the questionnaire scoring rubric). The effectiveness test in this study used the one-sample t-test with a significance level of $\alpha = 0.05$. The results of the effectiveness test using the one-sample t-test are presented in the following table.

Table 5. Result One Sample t Test

Class	Variable	One Sample t Test
Experimental 1	Mathematical Literacy	$t = -1{,}24\ p-value = 0{,}883$
	Self-efficacy	$t = 12{,}43\ p-value = 0{,}001$
Experimental 2	Mathematical Literacy	$t = 17{,}90\ p-value = 0{,}001$
	Self-efficacy	$t = 11{,}77\ p-value = 0{,}001$

The decision criterion for the one-sample t-test is that the null hypothesis (H_0) is rejected if the t-value exceeds $t_a(n–1) = t_{0.05}(16) = 1.7459$, or if the p-value is less than 0.05. Based on Table 26, the posttest data for mathematical literacy in experimental class 1 yielded a t-value of -1.24 < 1.7459 and a p-value of 0.883 > 0.05. Therefore, H_0 is accepted. This means that, at a significance level of 0.05, differentiated instruction with the RME approach was not effective in improving students' mathematical literacy in experimental class 1. In contrast, for the self-efficacy variable in experimental class 1, the posttest results yielded a t-value of 12.43 > 1.7459 and a p-value of 0.001 < 0.05. Thus, H_0 is rejected. This indicates that, at a significance level of 0.05, the implementation of differentiated instruction with the RME approach in experimental class 1 was effective in enhancing students' self-efficacy.

For experimental class 2, the posttest results for mathematical literacy showed a t-value of 17.90 > 1.7459 and a p-value of 0.001 < 0.05. Therefore, H_0 is rejected. This means that, at a significance level of 0.05, the use of differentiated instruction with the RME approach was effective in improving mathematical literacy among fast learners. Similarly, for the self-efficacy variable in experimental class 2, the posttest results showed a t-value of 11.77 > 1.7459 and a p-value of 0.001 < 0.05. Hence, H_0 is rejected. It can be concluded that, at a significance level of 0.05, the differentiated instruction with the RME approach was effective in improving self-efficacy in this group as well.

The next analysis conducted was a comparison of the effectiveness between the two experimental classes. This was done using a mean vector comparison test on both the pretest and posttest data. The first test was conducted on the pre-treatment (pretest) data using a MANOVA with Pillai's Trace statistic, applied to the students' scores in mathematical literacy and self-efficacy prior to the intervention. The analysis was performed using RStudio software. The results of the Pillai's Trace test are presented in the following table.

Table 6. Result Pillai's Trace Test

Data	Pillai's Trace	F	$p-value$
Pretest	0,074	1,242	0,3028

Based on Table 6, the p-value was 0.3028 > 0.05, indicating that H_0 is accepted. This means that there was no significant difference in the initial (pretest) mean scores between experimental class 1 and experimental class 2 in terms of students' mathematical literacy and self-efficacy. Since there were no differences in baseline abilities between the two classes, the analysis proceeded using the posttest data from both classes. The test employed was a MANOVA using Pillai's Trace, applied to the post-treatment data for mathematical literacy and self-efficacy, conducted with the aid of RStudio software. The results of the Pillai's Trace test are presented in the following table.

Table 7. Result Pillai's Trace Test

Data	Pillai's Trace	F	$p-value$
Posttest	0,389	9,884	0,00048

Based on Table 7, the p-value was 0.00048 < 0.05, indicating that H_0 is rejected. This result signifies that there is a significant difference in the post-treatment mean scores between experimental class 1 and experimental class 2 in terms of students' mathematical literacy and self-efficacy. Given that the multivariate hypothesis test on posttest data revealed significant differences in average scores between the two classes, a follow-up univariate difference test was deemed necessary. The results of both the pretest and posttest mean vector analysis indicated a multivariate effect, thus it was appropriate to proceed with separate univariate t-tests using the Independent Samples t-Test. The purpose of the univariate mean difference test was to determine which class benefited more from the implementation of differentiated instruction with the RME approach, in terms of mathematical literacy and self-efficacy. The data used in this analysis were the posttest scores of mathematical literacy and self-efficacy from both experimental class 1 and experimental class 2. The results of the Independent Samples t-Test are presented in the following table.

Tabel 8. Result Independent Sample t Test

Test	Variable	t-test	$p-value$
Independent sample t test	Mathematical Literacy	4,4361	0,0001
	Self-efficacy	1,1735	0,2493

The decision criterion for the independent samples t-test is that the null hypothesis (H_0) is rejected if the t-value exceeds $t_{0.05}(32) = 2.036$, or if the p-value is less than 0.05. Based on Table 8, it can be observed that for the mathematical literacy variable, experimental class 2 obtained a |t-calculated| value greater than the critical t-value ($|-4.4361| > 2.036$), and a p-value of 0.0001 < 0.05. Therefore, H_0 is rejected. This indicates that there is a significant difference in the posttest mathematical literacy scores between the two classes, with experimental class 2 scoring significantly higher than experimental class 1. Overall, it can be concluded that the implementation of differentiated instruction with the RME approach in experimental class 1 was less effective than in experimental class 2 in terms of improving mathematical literacy. For the self-efficacy variable, experimental class 2 obtained a |t-calculated| value of $|-1.1735|$, which is less than the critical t-value of 2.036, and a p-value of 0.0001 < 0.05. Therefore, H_0 is not rejected. This indicates that there is no significant difference in self-efficacy scores between the two classes after the treatment.

The hypothesis test for effectiveness used to assess the impact of the instructional approach on students' mathematical literacy and self-efficacy in experimental class 1 was the one-sample t-test. Based on the results, a p-value of 0.883 > 0.05 was obtained for the mathematical literacy variable. This indicates that, in experimental class 1, differentiated instruction with the RME approach was not effective in improving students' mathematical literacy.

Discussion

The hypothesis test for effectiveness used to assess the impact of the instructional approach on students' mathematical literacy and self-efficacy in experimental class 1 was the one-sample t-test. Based on the results, a p-value of 0.883 > 0.05 was obtained for the mathematical literacy variable. This indicates that, in experimental class 1, differentiated instruction with the RME approach was not effective in improving students' mathematical literacy. This ineffectiveness may be attributed to the fact that slow learners tend to require extensive, structured, and explicit scaffolding from the teacher in order to understand the material thoroughly. The findings of Susilo & Prihatnani (2022) show that slow learners need scaffolding that is contextual, rational, systematic, and easy to comprehend. In contrast, the role of the teacher in the RME approach goes beyond providing scaffolding; it also emphasizes creating opportunities for student exploration and discovery learning, making the learning process more meaningful and fostering student autonomy (Gravemeijer, 1994, p. 187). Moreover, the differentiated instruction based on student interests may not be well suited for slow learners. These students often benefit more from uniform learning contexts, where all students are engaged with similar materials. When instructional content in slow learner classes is differentiated according to individual interests, students assigned to different interest categories may become confused, as they struggle to understand materials that differ from those being studied by their peers. Even if student groupings are organized by interest, such arrangements may inhibit peer interaction and group discussion, thereby reducing the overall effectiveness of the learning process.

In contrast, based on the effectiveness test results for the self-efficacy variable using the one-sample t-test in experimental class 1, a p-value of 0.001 < 0.05 was obtained. This indicates that the implementation of differentiated instruction with the RME approach was effective in enhancing students' self-efficacy in this class. For students with slow learning abilities, self-efficacy can be improved through the provision of specific instructional strategies (Zainudin et al., 2019). The study by Lai et al. (2020) concluded that the implementation of differentiated instruction can enhance students' self-efficacy. In addition, research by Gulo et al. (2024) also confirmed that the RME approach contributes positively to improving students' self-efficacy. Based on these findings, it can be concluded that differentiated instruction integrated with the RME approach is effective in improving self-efficacy. Therefore, it may be stated that, in experimental class 1 (slow learners), the implementation of differentiated instruction with the RME approach was not effective in terms of mathematical literacy, but was effective in terms of enhancing students' self-efficacy.

The effectiveness hypothesis test used to evaluate the impact of the instructional approach on students' mathematical literacy and self-efficacy in experimental class 2 employed a one-sample t-test. Based on the results, a p-value of 0.001—less than 0.05—was obtained for both the mathematical literacy and self-efficacy variables. This indicates that the implementation of differentiated instruction with the RME approach was effective in enhancing both mathematical literacy and self-efficacy among students in experimental class 2. In differentiated instruction, students are grouped based on their individual interests. According to a study by Haelermans (2022) grouping students based on their learning strategies—including interests and learning styles—can significantly improve both learning outcomes and student motivation. In the context of fast learners, grouping students based on similar interests can further encourage in-depth conceptual exploration through problem-solving activities aligned with their preferences. Moreover, the RME approach, which emphasizes horizontal mathematization (transforming real-world problems into mathematical representations) and vertical mathematization (solving problems within formal mathematical systems) (Gravemeijer, 1994), is closely aligned with the indicators of mathematical literacy. This alignment enhances students' ability to apply mathematics in real-world contexts. Therefore, the implementation of differentiated instruction integrated with the RME approach can be considered effective in improving mathematical literacy among fast learners.

In addition to being effective in terms of mathematical literacy, the implementation of differentiated instruction with the Realistic Mathematics Education (RME) approach was also effective in enhancing students' self-efficacy. Research by Lai et al. (2020) concluded that the use of differentiated instruction can significantly improve students' self-efficacy. Furthermore, findings by Gulo et al. (2024) also indicated that the RME approach positively contributes to the development of self-efficacy in students. Based on this evidence, it can be concluded that differentiated instruction integrated with the RME approach is effective in improving students' self-efficacy. Taken together, these findings suggest that in experimental class 2 (fast learners), the implementation of this instructional model was effective in enhancing both mathematical literacy and self-efficacy.

To determine which class benefited more effectively from the implementation of differentiated instruction with the RME approach, a comparative analysis was conducted. This comparison aimed to evaluate the relative effectiveness of the approach in terms of students' mathematical literacy and self-efficacy. Before comparing the two classes, an initial equivalence test was conducted to assess whether the two groups had similar levels of mathematical literacy and self-efficacy prior to the intervention. This test was carried out using pretest data and employed a mean vector comparison test (Pillai's Trace) to assess baseline equivalence. The results yielded a p-value of 0.3028 > 0.05, indicating that the two classes did not differ significantly in their initial mathematical literacy and self-efficacy scores. To examine whether the classes differed after the instructional intervention, a posttest mean vector comparison was performed using Pillai's Trace. The results showed a p-value of 0.00048 < 0.05, indicating a significant difference between the two classes in terms of their post-intervention mathematical literacy and self-efficacy scores.

Based on the results of the posttest analysis, it was found that the two classes demonstrated significant differences in both mathematical literacy and self-efficacy. Therefore, an independent samples t-test was conducted to determine which class benefited more effectively from the implementation of differentiated instruction with the RME approach. The results of the t-test for the mathematical literacy variable showed a p-value of 0.0001 < 0.05, indicating a statistically significant difference between experimental class 1 and experimental class 2. According to the descriptive statistics, the mean posttest score for mathematical literacy in experimental class 2 was higher than that of experimental class 1. Specifically, the mean score in experimental class 1 was 61.00, while in experimental class 2 it was 93.00. This difference in mean scores is considerable. The mean posttest score in experimental class 1 did not meet the school's KKTP (Minimum Competency Achievement Criteria) standard, whereas the mean in experimental class 2 exceeded this threshold. The KKTP standard set by the school is 70.

For the self-efficacy variable, the independent samples t-test yielded a p-value of 0.2493 > 0.05. This indicates that there was no statistically significant difference in the posttest self-efficacy scores between the two classes. Based on the results of the descriptive statistical analysis, the difference in mean scores for self-efficacy after the intervention between experimental class 1 and experimental class 2 was relatively small. The mean score in experimental class 1 was 69.65, while the mean in experimental class 2 was 72.118. According to the self-efficacy criteria established in this study, both means fall within the high self-efficacy category. Thus, it can be concluded that both classes demonstrated high levels of self-efficacy following the implementation of the instructional intervention, despite the absence of a significant difference between them.

Conclusion

Based on the findings and discussion presented in the previous sections, the conclusions of this study are as follows: 1) Differentiated instruction with the Realistic Mathematics Education (RME) approach was not effective in improving mathematical literacy among students in experimental class 1 (slow learners). This is supported by the result of the one-sample t-test, which yielded a p-value = 0.883 > 0.05. However, the implementation was effective in enhancing students' self-efficacy in the same class, as indicated by the p-value = 0.001 < 0.05. 2) Differentiated instruction with the RME approach was effective in improving both mathematical literacy and self-efficacy in experimental class 2 (fast learners). This conclusion is supported by the results of the one-sample t-tests for both variables, each yielding a p-value = 0.001 < 0.05. 3) When comparing experimental class 1 (slow learners) and experimental class 2 (fast learners) to determine which group benefitted more from the implementation of differentiated instruction with the RME approach, it was found that experimental class 2 was more effective in terms of both mathematical literacy and self-efficacy. This conclusion is supported by the higher mean posttest scores in Experimental Class 2 for both variables.

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