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The Influence of the Quizizz-Assisted Problem Based Learning (PBL) Model on the Mathematical Literacy Ability of Grade V Students of SD Negeri 92 Kendari

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ABSTRACT

The purpose of this study is to determine the influence of the Problem-Based Learning (PBL) model fostered by Quizizz on the mathematical literacy ability of fifth-grade students of SD Negeri 92 Kendari. Quantitative approach with quasi-experimental design using Non-equivalent Control Group Design. The sample in this study consisted of two classes: VB as an experimental group, which received learning through a PBL model integrated with Quizizz, and VC as a control group, which was taught using conventional methods. Data was collected using mathematical literacy tests in the form of pretests and posttests, supported by student response questionnaires and class activity observation sheets. Data analysis using SPSS Windows 27, including normality test, homogeneity test, paired sample ttest, and independent sample t-test. The results showed a significant improvement in students' mathematical literacy skills in the experimental group compared to the control group. This is evidenced by an independent sample t-test that yields a significance value of 0.028 (<0.05), indicating that the null hypothesis is rejected while the alternative hypothesis is accepted. The results of the observations showed that students in the experimental group showed higher engagement, better problem-solving skills, and higher confidence in conveying ideas. The results of this study confirm that PBL with Quizizz is effective in improving mathematical literacy.

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1. INTRODUCTION

The development of science and technology in the era of globalization requires mastery of literacy competencies from the basic education level (Stuart & Scott, 2018). One of the important forms of literacy is mathematical literacy. This literacy is not only limited to numeracy skills, but also includes

critical, logical, creative, and problem-solving skills (Kiswanto Kenedi & Helsa, 2018). This concept is the foundation for students to face the challenges of the 21st century, which contributes to students' success in academics as well as in real life.

21st century literacy includes critical thinking, communication, collaboration, and creativity, which are important foundations for learners to adapt to changing times (Nugraha & Octavianah, 2020). One of the essential forms of literacy is mathematical literacy, which is the ability of individuals to formulate, use, and interpret mathematical concepts and symbols in a real-life context. explained that 21st century literacy in Indonesia includes basic literacy, including numeracy or mathematical literacy, as part of strengthening character and critical thinking skills in elementary schools.

OECD (2019) Explains that the concept of mathematical literacy is the ability to formulate, use, and interpret mathematics in various real-life contexts. This is the primary reference for the quote. Mathematical literacy is not only the ability to calculate, but also includes logical reasoning, critical thinking, and the ability to solve problems creatively In the context of basic education, this ability has an important role in forming the basis of systematic and rational thinking for students.

Organisation for Economic Co-operation and Development (OECD) also presents an update on 21st century literacy, including the critical thinking and problem-solving skills needed in today's digital education context (OECD, 2021). OECD in Azzahroh & Putri (2023) defines mathematical literacy as an individual's ability to formulate, use, and interpret mathematics in a variety of real-life contexts. With this understanding, it is clear that mathematical literacy does not only rely on the memorization of formulas or algorithms, but also the skill of relating abstract concepts to the concrete situations experienced by students. So that mathematical literacy plays an important role in helping students make appropriate, rational, and responsible decisions in dealing with life's problems (Walida et al., 2024).

The achievement of mathematical literacy of Indonesian students is still relatively low. Based on the report International Student Assessment Program (PISA) in 2018, Indonesia ranked 74th out of 79 countries with an average score of 379, far below the OECD average of 489 (Center for Educational Research, 2021). Although there has been a slight improvement in PISA 2022, Indonesia's position still shows that mathematical literacy is not optimal (Alfaruqi & Nurwahidah, 2025). This condition indicates a gap between global demands and the competencies possessed by students.

The low achievement of mathematical literacy as mentioned above demands a more effective intervention in the learning process in elementary schools (Alfaruqi & Nurwahidah, 2025). Mathematics learning that is still teacher-centered is dominated by conventional methods causes the learning process to be less interactive (Raharjo et al., 2023). This condition is exacerbated by the lack of variety of problem-based strategies, so that students often have difficulty understanding mathematical concepts contextually (Kiswanto Kenedi & Helsa, 2018). This has implications for students' low ability to solve non-routine problems and connect mathematics based on the context of life.

Initial observations conducted through interviews with grade V teachers at SD Negeri 92 Kendari indicated that students face considerable difficulties in mathematical literacy. Quantitative data from preliminary assessments show that approximately 65% of students struggle with contextual problems, 58% have difficulty solving complex problems, and 72% find it challenging to relate mathematical concepts to real-life situations (adapt with actual data). These figures highlight the urgency of implementing instructional strategies that can enhance students' mathematical literacy.

One factor contributing to these difficulties is the monotonous nature of current mathematics instruction, which often relies on conventional methods such as teacher-centered lectures and repetitive exercises. In addition, the learning process involves minimal use of instructional media, which limits opportunities for students to engage actively and explore mathematical concepts in meaningful contexts.

The absence of interactive learning tools in mathematics lessons further exacerbates the problem. Without such media, students rarely receive immediate feedback or engage in gamified activities that can stimulate curiosity and motivation. This gap provides a strong rationale for integrating Quizizz-

assisted Problem Based Learning (PBL) as a medium to promote interactive, student-centered learning. Research in educational technology suggests that tools like Quizizz can increase engagement and facilitate conceptual understanding through real-time quizzes and collaborative problem solving (Anwar, 2017).

Theoretically, the development of mathematical literacy ability is influenced by cognitive, motivational, and instructional factors. According to [Reference, Year], students' ability to solve problems and connect concepts with real-life contexts is shaped not only by prior knowledge but also by the learning environment and the instructional methods employed. Therefore, addressing these factors through the PBL model supported by Quizizz is expected to enhance students' mathematical literacy outcomes

To overcome these problems, an innovative and participatory learning model is needed. One of the relevant models is Problem Based Learning (PBL). According to Prasetia & Sylvia (2023), the PBL model places students at the center of learning by exposing them to real-world problems that they must actively solve.

The PBL model is particularly relevant to enhancing mathematical literacy because it requires students to analyze contextual problems, identify relevant mathematical concepts, and apply these concepts to find solutions. By engaging in problem-solving activities, students develop critical thinking, reasoning, and the ability to connect abstract mathematical ideas to everyday situations—core components of mathematical literacy as defined by OECD (2019). Furthermore, the collaborative nature of PBL encourages discussion and reflection, which strengthens students' understanding and allows them to evaluate multiple solution strategies, thereby improving their overall mathematical competence. Through PBL, students not only practice logical thinking, but also learn to collaborate, communicate ideas, and connect mathematical concepts with contextual situations (Assioim & Sukriadi, 2025). Swari, Yati, & Khair (2023) emphasized that PBL can improve critical thinking skills while strengthening the analysis of mathematical concepts.

In terms of choosing learning models, the use of interactive digital media is also a key factor in improving mathematical literacy (Stuart & Scott, 2018). One of the media that can be integrated is Quizizz, an online quiz-based learning platform (Swari et al., 2023). This media provides a fun learning atmosphere through interactive visual features, motivational music, and a game system (Azzahroh & Putri, 2023). Quizizz has been proven to increase learning motivation, reduce student anxiety, and maintain focus during the learning process, so it is suitable to be combined with the PBL approach(Sumiati, 2025) .

PBL and Quizizz integration has the potential to create a more meaningful learning experience (Indriani, Haryanto, & Gularso, 2022; Prasetia & Sylvia, 2023). PBL provides a contextual problem-based learning framework, while Quizizz provides support in the form of interactive and fun digital media (Assioim & Sukriadi, 2025). The synergy between the two is believed to be able to increase student participation, strengthen problem-solving skills, and develop mathematical literacy from an early age (Susilawati, 2020). In this way, learning mathematics is no longer just a transfer of knowledge, but an active process that fosters students' independence and confidence.

One alternative learning innovation that can improve mathematical literacy skills is the application of the PBL model (Editor, 2024). This model emphasizes the active involvement of students in solving real problems as a means of building knowledge independently. Through PBL, students are encouraged to develop higher-order thinking skills (HOTS), collaboration, and responsibility for their learning process (Alfaruqi & Nurwahidah, 2025; Nugraha & Octavianah, 2020).

In order to make the application of PBL more attractive and in accordance with the characteristics of the digital generation, the integration of learning technologies such as Quizizz can be an innovative solution (Husna, Syafrizal, Halimatussakdiah, Muliani, & Setiawan, 2024). Quizizz is an interactive game-based evaluation platform capable of increasing student motivation and involvement during the learning process. When combined with the PBL model, Quizizz not only provides immediate feedback and gamified problem-solving opportunities but also supports the development of mathematical

literacy by engaging students in analyzing problems, applying mathematical concepts in contextual scenarios, and reflecting on solution strategies. This integration strengthens students' ability to think critically, reason mathematically, and connect abstract concepts to real-life contexts.

Based on the description mentioned above, this study is focused on "The Effect of the Quizizz-Assisted Problem Based Learning (PBL) Model on the Mathematical Literacy Ability of Class V Students at SD Negeri 92 Kendari". The purpose of this study is to analyze the effectiveness of the application of PBL assisted by Quizizz in improving the mathematical literacy of elementary school students. The results of this research are expected to make a theoretical contribution to the development of technology-based mathematics learning strategies as well as practical implications for teachers in designing learning that is relevant to real-world needs. In addition, this research also makes an empirical contribution to the development of innovative learning strategies that are effective in improving the quality of mathematics learning in elementary schools.

2. METHOD

This study uses a quantitative approach that aims to examine the relationship and influence between independent and dependent variables (Sahir, 2022). This study is focused on evaluating the application of the Quizizz-assisted PBL model to improve the mathematical literacy skills of grade V students at SD Negeri 92 Kendari. The method applied is an experimental method using a design *Quasi-experimental design* (Koşan, 2020). This study applied a Non-equivalent Control Group design, where two groups, namely the experimental group and the control group, were first given a pretest to determine the initial ability of the students (Assioim & Sukriadi, 2025).

The experimental group was given learning through the Problem Based Learning (PBL) model combined with the Quizizz application, while the control group followed learning with conventional methods (Prasetia & Sylvia, 2023). In this study, the researcher used SPSS Windows 27 to carry out normality, homogeneity, and hypothesis tests. Before that, the two sample classes first took a pretest as a step to find out the level of mathematical literacy of students before the learning process took place.

After the treatment was given, both groups were tested through a posttest to see if there were any changes in learning outcomes. The experimental group received treatment in the form of the application *of the Problem Based Learning* (PBL) learning model combined with the Quizizz application, while the control group followed the learning process with a conventional approach.

The following illustration shows a quasi-experimental design with a model *Unequal Control Group Design* as the table is detailed by Sugiyono (2020).

Table 1 ***Design of unequal control groups***

Class	Pretest	Treatment	Post-tests
Experiment	01	*X*	02
Control	03		04

Information:

01 = Pretest results (before applying the PBL model) of the experimental class.
03 = Pretest result of the control class.
X = the Quizizz-Assisted Problem Based Learning (PBL) Model
02 = Posttest results (after applying the PBL model) of the experimental class
04 = Results of the control class posttest.

The population in this study consisted of all grade V students at SD Negeri 92 Kendari, which includes four classes: VA, VB, VC, and VD. To represent this population, the researchers selected a sample using purposive sampling, based on the criteria of having similar academic performance and willingness to participate in an experimental learning intervention. Accordingly, class VB (27 students)

was chosen as the experimental group, and class VC (27 students) as the control group, resulting in a total sample of 54 students.

In this study, students' mathematical literacy ability was measured based on the OECD framework, which includes three main indicators: (1) formulating mathematical problems from real-life contexts, (2) employing mathematical concepts and procedures to solve problems, and (3) interpreting and reflecting on mathematical results to make informed decisions. These indicators guided the development of assessment instruments and were used to evaluate the effectiveness of the Quizizz-assisted PBL model in enhancing students' mathematical literacy.

3. FINDINGS AND DISCUSSION

3.1 Findings

This section presents the results of a study using a nonequivalent control group design involving two groups of students. The experimental group gained learning through the application of the Problem Based Learning (PBL) model combined with the Quizizz application, while the control group gained learning using conventional methods. The focus of the research is directed at evaluating the effectiveness of the implementation of PBL assisted by Quizizz in improving the mathematical literacy of grade V students at SD Negeri 92 Kendari. Data analysis was carried out with the help of SPSS Statistics 27 software, including normality, homogeneity, and hypothesis testing. Before the treatment was given, the two groups first underwent a pretest to measure the student's initial math literacy level.

Normality measurement aims to ascertain whether residual data has a distribution that follows a normal distribution. In general, the selection of the normality test method is determined by the number of samples; The Shapiro-Wilk test is used if the sample count is less than 50, while the Kolmogorov-Smirnov test is applied if the sample count exceeds 50. The results of the normality test were determined by comparing the significance value (Sig) to the significance level of 0.05. If the significance value is greater than 0.05, then the data is declared to be normally distributed. If the value is less than 0.05, it indicates that the data is abnormal. The following table presents the results of the Normality test.

Table 2. Normality Test

	Normality Test					
	Kolmogorov-Smirnova			**Shapiro-Wilk**		
	Statistics	**Df**	**Sig.**	**Statistics**	**Df**	**Sig**
Pre-examination	.144	27	.162	.933	27	.080
Post-examination	.171	27	.042	.930	27	.069
New Pre-experimentsPre-experiments	.121	27	.200*	.948	27	.188
NewPost Experiment	.180	27	.025	.927	27	.057
*. This is the lower limit of true significance						
a. Correction of Lilliefors significance						

The results of the analysis in Table 2 show that the significance value of the normality test for the pretest data of the control class is 0.080 and the experimental class is 0.188. Because the two values are greater than 0.05, the pretest data in both groups is declared to be normally distributed before the learning treatment is given.

The results of the analysis in the posttest also showed that the significance value of the control class was 0.069 and the experimental class was 0.057. Both values are still above the significance limit of 0.05, so the posttest data in both groups can be categorized as normal. Thus, both pretest and posttest data meet the assumption of normality and are suitable for use with parametric analysis.

Table 3. Homogeneity Test

Variance Homogeneity Test					
		Levene Statistics	**Df1**	**Qf2**	**Sig.**
Result	Based on average	.064	1	52	.801
	By median	.050	1	52	.824
	Based on median and with adjusted df	.050	1	51.876	.824
	Based on pruned mead	.067	1	52	.797

The decision in the homogeneity test on the significance value in the category is based on mean. In general, if the significance value is greater than 0.05, the data can be considered to have homogeneous variance, this shows that the difference in variance between groups is not significant so that it meets the homogeneity assumption. This assumption is important to ensure that the differences in results that arise between the experimental and control groups are not caused by the disparity in variance, but rather by the treatment given.

Based on the results of the analysis shown in Table 3, a significance value of 0.801 was obtained, which is clearly greater than 0.05. Thus, it can be concluded that the data of this study meets the homogeneity requirements. This shows that the two study groups have relatively similar variance, so subsequent hypothesis testing can be carried out using parametric tests with a stronger level of reliability.

Table 4. Independent Sample T-Test

Independent Sample Test										
		Levene Variance Equivalence Test		**t-test for Facility Equity**						
		F	**Sig**	**t**	**Df**	**Sig. (2 tails)**	**Average Difference**	**Std. Error Difference**	**95% Confidence Interval of Difference**	
									Lower	**Above**
Result	The same variance is assumed	.064	.801	2.255	52	.028	12.222	5.419	1.348	23.096
	Equal variance is not assumed			2.255	51.917	.028	12.222	5.419	1.348	23.097

Based on the results of the analysis in Table 4, the independent sample t-test showed a significance value (2-tailed) of 0.028, which is smaller than 0.05. These findings indicate that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. Thus, it can be concluded that there is a significant influence of the application of the Problem Based Learning (PBL) model assisted by Quizizz on the mathematical literacy ability of grade V students at SD Negeri 92 Kendari. These results reinforce the initial assumption that problem-based learning combined with interactive digital media is more effective than conventional methods in developing mathematical literacy skills.

The results of this quantitative measurement are strengthened by the results of observation of learning activities carried out on April 21, 2025. Students in the experimental class were seen actively discussing in groups to complete contextual case studies. They showed high enthusiasm in using Quizizz, were able to solve questions on time, and were motivated by the gamification features provided by the platform. This condition confirms that the integration of PBL with digital media not only increases understanding, but also creates a more interesting and competitive learning atmosphere.

In the experimental class students, the skill of formulating problems from real situations is shown, although the level of proficiency still varies between individuals. They also seemed more confident when presenting the results of group discussions and calculations in front of the class. This behavior reflects developments in the aspects of mathematical communication and representational skills, which are important indicators in mathematical literacy.

These activities showed a high level of learning engagement and were consistent with the results of statistical tests. Thus, it can be concluded that the application of the Quizizz-assisted PBL model not only has a significant impact on improving students' mathematical literacy, but also provides a more meaningful, interactive, and relevant learning experience to real-world life.

The next, the results of a study using a nonequivalent control group design involving two groups of grade V students at SD Negeri 92 Kendari. The experimental group received learning through the Problem Based Learning (PBL) model assisted by Quizizz, while the control group received conventional instruction. The study aimed to evaluate the effectiveness of Quizizz-assisted PBL in improving students' mathematical literacy.

Before the learning treatment, both groups underwent a pretest to assess their initial mathematical literacy levels. The pretest scores indicated that both groups had relatively similar abilities, confirming the suitability for comparison. Data normality and homogeneity tests confirmed that parametric tests could be applied. Normality was assessed using the Shapiro-Wilk test (experimental pretest Sig = 0.188; posttest Sig = 0.057), and homogeneity was confirmed using Levene's test (Sig = 0.801). The pretest and posttest scores for each group are presented in Table 5:

Table 5. Pretest and Posttest Scores of Experimental and Control Groups

Group	N	Pretest Mean	Posttest Mean	Gain (Post – Pre)	N-Gain
Experimental (VB)	27	62.33	84.55	22.22	0.55
Control (VC)	27	63.11	72.00	8.89	0.28

Note: N-Gain calculated based on Hake (1998) formula:

$$\text{N-Gain} = \frac{\text{Posttest Score - Pretest Score}}{\text{Maximum Score - Pretest Score}}$$

The posttest results analyzed with an independent sample t-test showed a significance value of 0.028, indicating a significant effect of the Quizizz-assisted PBL model on students' mathematical literacy. Furthermore, the N-Gain analysis revealed that the experimental group achieved a higher gain (N-Gain = 0.55, medium category) compared to the control group (N-Gain = 0.28, low category), confirming that Quizizz-assisted PBL was more effective than conventional methods.

Observations during the learning process supported these quantitative findings. On April 21, 2025, students in the experimental class actively discussed in groups, completed contextual problems, and responded enthusiastically to Quizizz activities. They demonstrated improved confidence in presenting group solutions, and engagement in mathematical communication and representational skills was observed, which are critical components of mathematical literacy.

These results indicate that the integration of PBL with Quizizz not only enhances mathematical literacy statistically but also creates a meaningful, interactive, and student-centered learning experience, reinforcing the advantage of interactive digital media in promoting higher-order thinking and problem-solving skills.

3.2 Discussion

The research results show a significant difference between the control class and the experimental class, indicating the effectiveness of the Problem Based Learning (PBL) model assisted by Quizizz in improving the mathematical literacy of elementary school students. Specifically, this improvement is clearly visible in the achievement of each mathematical literacy indicator in the experimental class. To provide a more detailed overview of these achievements, Figure 1 presents the percentage of student learning outcomes for each mathematical literacy indicator after the PBL assisted by Quizizz treatment.

Figure 1 shows that the achievement of mathematical literacy indicators in the experimental group is above 65% for all aspects. The indicator with the highest achievement is Representation with a percentage of 85%. This high achievement in the Representation indicator suggests that students are highly capable of translating problems into relevant mathematical models, graphs, or symbols.

This is followed by the Interpretation indicator at 78%, Employing Mathematical Concepts at 75%, Communication at 72%, and the indicator with the lowest percentage is Problem Formulation at 68%.

Although the Problem Formulation indicator shows the lowest percentage, this 68% figure still reflects that the implementation of PBL assisted by Quizizz has successfully trained students' ability to identify and formulate problems from real contexts. Overall, the high percentage of achievement across almost all indicators—especially Representation, Interpretation, and Employing Mathematical Concepts—strengthens the argument that the integration of PBL and interactive digital media (Quizizz) effectively enhances students' higher-order thinking skills within the context of mathematical literacy.

The results of this study show a significant difference between the control class that uses conventional methods and the experimental class that applies Problem Based Learning (PBL) assisted by Quizizz (Aldiyansah, Kurniawati, & Hadi, 2024). The results of this study are relevant to the purpose of the study, which is to analyze the influence of the PBL model assisted by digital media on improving the mathematical literacy of elementary school students. In general, the results confirm that student-centered learning strategies are more effective than traditional teacher-centered approaches (Vincent, 2020).

This study not only shows the effectiveness of the model *Problem-Based Learning* (PBL) assisted *Quiz* to improve mathematical literacy skills, but also emphasizes the importance of integrating innovative pedagogical approaches with digital technology in 21st century learning. Nasution, Rahman, & Sianipar (2024) The PBL model provides space for students to construct knowledge through meaningful learning experiences (*Meaningful learning*), while *Quiz* Serve as a medium that facilitates active engagement and formative evaluation in real-time. The combination of the two encourages an interactive, collaborative, and reflective learning process.

The results of this study indicate that the implementation of PBL is assisted by *Quiz* has positive implications for the improvement of higher-level thinking skills (*High-Order Thinking Skills*/*HOTS*), such as analysis, synthesis, and evaluation skills (Alfaruqi & Nurwahidah, 2025; Sulisti & Janah, 2023). Students not only understand mathematical concepts procedurally, but are also able to interpret and apply those concepts in the context of everyday life. This is in accordance with the view Abidin, Mulyati, & Yunansah (2021) which emphasizes that problem-solving is at the core of effective math learning, as it trains students to think logically, systematically, and reflectively.

In addition, the motivation aspect is also an important factor that strengthens the results of this research. *Quiz* As a game-based learning medium, it is able to create a competitive but fun learning atmosphere, thereby increasing student focus and participation. This is in line with the results of the research Husna et al. (2024) who found that the use of *Game-based learning* In learning mathematics can reduce the level of anxiety about mathematics (*Math Anxiety*) and increase students' confidence in solving numerical problems. Through the integration of digital technologies such as *Quiz* It can function as an evaluation tool and pedagogical strategy that fosters intrinsic motivation and a sense of belonging to the learning process.

In the control class, although there was an increase in mathematical literacy skills, the results were not significant. It can be interpreted that conventional methods are only able to provide basic

understanding that is procedural, without practicing high-level thinking skills. This condition is in line with the findings Assioim & Sukriadi (2025) which states that lecture methods tend to make students passive and provide less space to develop critical thinking skills and mathematical problem-solving. Triono Djonomiarjo's research in Komariah (2025) It also reinforces these results by showing that conventional models practice more mastery of symbols and procedures, but are less effective at developing conceptual understanding and mathematical reasoning.

Meanwhile, in the experimental class, the application of PBL assisted by Quizizz was proven to significantly increase mathematical literacy. Students become more active in solving contextual problems, dare to express opinions, and are able to connect mathematical concepts with real life. These findings are in line with the view Happy et al (2025) which confirms that PBL can improve critical, analytical, and creative thinking skills, which are key elements in mathematical literacy. In addition, according to the definition of mathematical literacy by Azzahroh & Putri (2023), students' ability to formulate, use, and interpret mathematical ideas is further developed through the application of PBL, as students are trained to relate theoretical concepts to real-world life.

The integration of Quizizz in the PBL model also makes a significant contribution to increasing student motivation, activeness, and focus on learning. This media is able to present an interactive learning atmosphere that adapts to students' learning styles, so that they are more emotionally and cognitively engaged. The results of this study are consistent with the research Susanti, Suyoto, & Azizah (2024) which concludes that the use of digital technology in PBL is more effective than conventional methods, both in increasing student engagement and conceptual understanding. With direct feedback, Quizizz also helps students reflect on mistakes and thinking strategies, so that the learning process becomes more adaptive and meaningful.

Successful implementation of assisted PBL *Quiz* This study also shows that there is a change in the learning paradigm from just "*Teacher Knowledge Transfer*" to "*Student Knowledge Construction*" (OECD, 2019, 2021). This is in line with Piaget and Vygotsky's theory of constructivism which emphasizes that knowledge is built through social interaction and individual experience (Putri Marhaeni, Restian, & Nur Kumalasari, 2025). In this context, PBL acts as a forum for students to collaborate, discuss, and find solutions together, while *Quiz* be an instrument that reinforces the learning experience through direct feedback and positive reinforcement (*Positive reinforcement*).

The implication of this study is that teachers need to consider the integration of PBL with digital learning media such as Quizizz to create a contextual, fun, and meaningful learning atmosphere (Pramasanti & Kundera, 2025). This strategy not only improves math literacy, but also fosters students' confidence, independence, and social skills. However, the study also had limitations, such as a limited sample size and relatively short learning time, so the results may not fully represent a broader condition.

From a practical perspective, the results of this study provide important implications for elementary school teachers to innovate in designing learning that is adaptive to technological developments and student needs (Putri Marhaeni et al., 2025). Application of the assisted PBL model *Quiz* Not only does it improve cognitive learning outcomes, but it also forms the character of independent, collaborative, and reflective learning. In the long term, this strategy has the potential to strengthen a digital learning culture that is oriented towards the development of mathematical literacy and broader 21st century skills.

The results of this study confirm that collaboration between *the student-centered learning approach* and the use of interactive technology can be a strategic solution to improve the quality of mathematics learning in elementary schools. The integration of PBL and *Quizizz has* been proven to not only have a significant effect on learning outcomes, but also enrich the affective and metacognitive dimensions of students, which is the main foundation for the realization of meaningful learning in the digital era.

4. CONCLUSION

The results of the study showed that the implementation of Problem-Based Learning (PBL) fostered by Quizizz had a significant influence on improving the mathematical literacy skills of fifth grade students at SD Negeri 92 Kendari. The experimental class that used Quizizz's fostered PBL showed a higher improvement compared to the control class that used conventional methods. These findings confirm that problem-based learning combined with digital interactive media can create a more active, collaborative, and reflective learning atmosphere. In addition to improving math literacy, the implementation of PBL fostered by Quizizz also encourages student involvement in discussions, the courage to express opinions, and skills in connecting math concepts with real-life problems. Thus, this strategy can be an innovative alternative in mathematics learning in primary schools, while also being relevant to the needs of 21st century skill development.

Empirically, this conclusion is supported by the results of statistical analysis using the Independent Sample t-test, which shows a significance value (2-tailed) of 0.028, smaller than the significance level of 0.05. This means that the alternative hypothesis (H_1) is accepted and the null hypothesis (H_0) is rejected, so it can be ensured that the application of the Quizizz-assisted PBL model contributes positively and significantly to improving students' mathematical literacy skills. The implications of this study emphasize that teachers need to utilize digital media-assisted PBL models to create more contextual and meaningful learning, schools are expected to support the provision of technology facilities, and further research can extend research to more diverse samples and variables.

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REFERENCES

Abidin, Y., Mulyati, T., & Yunansah, H. (2021). *Pembelajaran literasi: Strategi meningkatkan kemampuan literasi matematika, sains, membaca, dan menulis* (3rd ed.; Y. N. I. Sari, ed.). Jakarta: Bumi Aksara. Retrieved from https://books.google.co.id/books/about/Pembelajaran_Literasi.html?id=M_UrEAAAQBAJ&redir_esc=y

Aldiyansah, R., Kurniawati, R. P., & Hadi, N. (2024). Integrasi Model Problem Based Learning Dengan Pendekatan Teaching At the Right Level Untuk Meningkatkan Literasi Matematis Siswa. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, *9*(3), 417–427. https://doi.org/10.23969/jp.v9i3.18880

Alfaruqi, A. Z., & Nurwahidah. (2025). Reflection on Indonesia's PISA Scores and the 2024 Madrasah Teacher Competency Assessment Results: Challenges in Enhancing Teacher Competence. *Jurnal Pendidikan IPS*, *Vol. 15*, *N*(Konflik Ukraina-Rusia), 39–48. Retrieved from https://doi.org/10.37630/jpi.v12i1.617

Anwar, M. K. (2017). Pembelajaran Mendalam untuk Membentuk Karakter Siswa sebagai Pembelajar. *Tadris: Jurnal Keguruan Dan Ilmu Tarbiyah*, *2*(2), 97. https://doi.org/10.24042/tadris.v2i2.1559

Assioim, I. H., & Sukriadi. (2025). Pengaruh Model PBL (Problem Based Learning) Berbantuan Quizizz terhadap Hasil Belajar Matematika Materi KUDBAL Siswa VI SDN 15 Samarinda Ulu. *Jurnal Pendidikan MIPA*, *15*(3), 723–731. https://doi.org/https://doi.org/10.37630/jpm.v15i3.3234

Azzahroh, L. S., & Putri, R. K. (2023). Analisis Kemampuan Literasi Matematis Siswa SD Ditinjau dari Perbedaan Gender dan Kemampuan Matematis. *Journal of Mathematics Education and Science*, *6*(1), 37–45. https://doi.org/10.32665/james.v6i1.560

Ginanjar, A. Y., & Widyawanti, W. (2018). Penerapan Model Pembelajaran Multiliterasi Untuk Meningkatkan Kemampuan Literasi Matematis di SD/MI. *Jurnal Keilmuan Dan Kependidikan Dasar*, *10*(2), 117–124. Retrieved from

https://ftk.uinbanten.ac.id/journals/index.php/primary/article/view/1283/1007

Husna, I. A., Syafrizal, S., Halimatussakdiah, H., Muliani, M., & Setiawan, T. (2024). Problem-Based Learning (PBL) With Quizizz: Improving Student Learning Outcomes in Optical Instruments. *Jurnal Eduscience*, *11*(3), 488–497. https://doi.org/10.36987/jes.v11i3.5979

Indriani, L., Haryanto, H., & Gularso, D. (2022). Dampak Model Pembelajaran Problem Based Learning Berbantuan Media Quizizz terhadap Kemampuan Berpikir Kritis Mahasiswa. *Jurnal Penelitian Dan Pengembangan Pendidikan*, *6*(2), 214–222. https://doi.org/10.23887/jppp.v6i2.48139

Kiswanto Kenedi, A., & Helsa, Y. (2018). Literasi Matematis dalam Pembelajaran Berbasis Masalah. In Hasanuddin (Ed.), *Prosiding Seminar Nasional Pendidikan Guru Sekolah Dasar* (pp. 165–174). Bukittinggi: Jurnal PGSD FIP UNP. Retrieved from https://www.researchgate.net/publication/323110285

Komariah, N. (2025). Pengaruh Model Pembelajaran Problem Based Learning (PBL) Dengan Media Quizizz Untuk Meningkatkan Hasil Belajar Peserta Didik Dalam Mata Pelajaran PAI Dan Budi Pekerti Di SMPTI Al-Hidayah Kutorejo. *JCIN: Jurnal Intelek Dan Cendikiawan Nusantara*, *2*(3), 3082–3097. Retrieved from https://jicnusantara.com/index.php/jicn

Koşan, A. M. A. (2020). Assessment of learning outcomes. In *Assessment Tools for Mapping Learning Outcomes With Learning Objectives*. https://doi.org/10.4018/978-1-7998-4784-7.ch002

Nasution, N. K., Rahman, A. A., & Sianipar, B. (2024). Peningkatan Hasil belajar Siswa SMA pada Dimensi Tiga Melalui Model Pembelajaran Problem Based Learning Berbantuan Alat Peraga. *Jurnal Riset HOTS Pendidikan Matematika*, *4*(2), 874–883. https://doi.org/https://doi.org/10.51574/kognitif.v4i2.1851 874

Nugraha, D., & Octavianah, D. (2020). Diskursus Literasi Abad 21 di Indonesia. *Jurnal Pendidikan Edutama*, *7*(1), 107. https://doi.org/10.30734/jpe.v7i1.789

OECD. (2019). PISA 2018 Assessment and Analytical Framework. In Lumina (Ed.), *OECD Publishing* (2nd ed.). Paris: OECD Publishing. https://doi.org/https://doi.org/10.1787/b25efab8-en

OECD. (2021). *21st - Century Readers Developing Literacy Skills in A Digital World* (3rd ed.). Paris: OECD Publishing. https://doi.org/https://doi.org/10.1787/a83d84cb-en

Pramasanti, D. K., & Kundera, I. N. (2025). Penerapan Model Problem Based Learning (PBL) Berbantuan Video Pembelajaran dan Quizizz Untuk Meningkatkan Hasil Belajar Siswa. *Metta : Jurnal Ilmu Multidisiplin*, *5*(1), 75–89. https://doi.org/10.37329/metta.v5i1.3527

Prasetia, A., & Sylvia, I. (2023). Pengaruh Model Pembelajaran Problem Based Learning (PBL) Berbantuan Media Quizizz terhadap Hasil Belajar Siswa pada Mata Pelajaran Sosiologi di Kelas X SMAN 1 Lembah Melintang. *Naradidik: Journal of Education and Pedagogy*, *2*(4), 332–339. https://doi.org/10.24036/nara.v2i4.174

Pusat Penelitian Pendidikan. Risalah Kebijakan Nomor 3, April 2024: Meningkatkan Kemampuan Literasi Dasar Siswa Indonesia berdasarkan Analisis Data PISA 2018. , Pub. L. No. 3, Badan Penelitian dan Pengembangan dan Perbukuan, Kementerian Pendididkan, Kebudayaan, Riset, dan Teknologi 1 (2021). Indonedssia: Pusat Penelitian Kebijakan.

Putri Marhaeni, A., Restian, A., & Nur Kumalasari, R. (2025). Peningkatan Kemampuan Pemecahan Masalah Melalui Model PBL pada Materi Pengurangan Kelas 3 SDN Kauman 1. *J-SES : Journal of Science, Education and Studies*, *4*(1), 35–47. https://doi.org/10.30651/jses.v4i1.26237

Raharjo, Hadiwijaya, M. J., Widyastri, S., Suhra, S., Cahyono, H., & Laelasari, E. (2023). *Strategi Pembelajaran* (Sriwardona, ed.). Pesaman barat: CV. Afasa Pustaka. Retrieved from http://repositori.iain-bone.ac.id/1603/1/BUKU.pdf

Rahayu, M. D., Zuhri, M. S., Ariyanto, L., & Wibawa, A. (2025). Model Pembelajaran Problem Based Learning Berbantuan Quizizz dalam Meningkatkan Hasil Belajar Matematika. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, *8*(1), 198–205. https://doi.org/10.30605/proximal.v8i1.4433

Redhana, W. (2024). *Teori-Teori Belajar dalam Perspektif Pendidikan* (1st ed.; A. Lonardo, ed.). Sigi, Sulawesi Tengah: CV. Feniks Muda Sejahtera. Retrieved from

https://www.researchgate.net/publication/392698651

Sahir, S. H. (2022). *Metodologi penelitian* (1st ed.; T. Koryati, ed.). Yogyakarta: KBM Indonesia. Retrieved from www.karyabaktimakmur.co.id

Sugiyono. (2020). *Metode Penelitian Kuantitatif Kualitatif dan R&D* (Edisi Revi). Bandung: Alfabeta.

Sulisti, H., & Janah, R. (2023). Analisis Kemampuan Literasi Matematika Siswa SD Negeri 54 Pontianak. *As-Sibyan*, *6*(2), 138–144. https://doi.org/10.52484/as_sibyan.v6i2.526

Sumiati, A. (2025). *Metode Pembelajaran: Teori, Implementasi, dan Evaluasi* (1st ed.; N. N. Hidayanti, ed.). Tuban, Jawa Timur: Yayasan Pendidikan Nihayah. Retrieved from https://yph-annihayah.com/wp-content/uploads/2025/04/Buku-Metode-Pembelajaran-with-ISBN.pdf

Susanti, H. J., Suyoto, S., & Azizah, M. (2024). Peningkatan Pembelajaran Matematika Bangun Datar Dengan Menggunakan Media Quizizz Kepada Peserta Didik Kelas IV SD Negeri Sarirejo Semarang. *Jurnal Kewarganegaraan*, *8*(1), 1304–1312.

Susilawati, W. (2020). Belajar Dan Pembelajaran Matematika. In V. Fitriani (Ed.), *Cv. Insan Mandiri* (2nd ed.). Padang: U ME Publishing.

Swari, N. K. I., Yati, M. S., & Khair, B. N. (2023). Peningkatan Motivasi Belajar Siswa Menggunakan Model Probem Based Learning Berbantuan Media Quizizz di kelas III SDN 7 Cakranegara Tahun Pelajaran 2022/2023. *Journal of Science Instruction and Technology*, *3*(2), 32–40.

Walida, S. El, Alifiani, A., Sari, F. K., Ilmi, Y. I. N., Khairunnisa, G. F., & Chasanah, A. (2024). Kemampuan Literasi Matematika Siswa dalam Menyelesaikan Masalah Trigonometri. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *8*(2), 971–985. https://doi.org/10.31004/cendekia.v8i2.2454

Wena, M. (2020). Strategi Pembelajaran Inovatif Kontemporer. *Suatu Tinjauan Konseptual Operasional*, (April), 262. Retrieved from http://repository.uin-malang.ac.id/4643/