

The Effect Of Problem-Based Learning Model Assisted By Google Sites On Students' Scientific Literacy Skills At SDN 067251 Medan Deli

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Abstract

This study aims to analyze the effect of the Problem Based Learning model assisted by Google Sites on students' scientific literacy skills by comparing the scientific literacy skills of experimental and control classes at SDN 067251 Medan Deli. This type of research is a quasi experimental design with Non equivalent Pretest-Posttest Control Group Design. In this study, The population was all fifth-grade students, 40 students in total. The instrument used in this study is a science literacy test. The results showed the sig. (2-tailed) $0.00 < 0.05$, it means Problem-Based Learning assisted by Google Sites affects students' scientific literacy skills.

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INTRODUCTION

One of the efforts to prepare the younger generation to face future challenges is to empower the younger generation, mostly of school age, in the learning process (Setiawan et al., 2019). Therefore, an education system must be built that is not only oriented toward students' ability to master learning material but must also be equipped with various 21st-century skills to solve problems encountered in everyday life.

The Indonesian government has issued policies to train 21st-century skills so that the quality of education in Indonesia improves, including the recovery of learning through the 2013 Curriculum. The presence of the 2013 Curriculum is an answer to the intense competition for human resources globally. There are three fundamental skills components in the 21st century: basic literacy, 4C competence, and character (Firdaus & Asmali (2021). Basic literacy allows learners to apply literacy skills in

everyday life. The World Economic Forum established scientific literacy as one of the six basic literacy that is very important for learners, parents, and all citizens of society (Forum, 2015). The other five basic literacy are literacy, numeracy, digital, financial, cultural, and civic (Fananta et al., 2017).

Scientific literacy is a person's ability to solve problems, acquire new knowledge, explain scientific phenomena, and draw conclusions based on evidence related to scientific problems (OECD, 2016; Wulandari & Sholihin, 2016). Scientific literacy is crucial in facing challenges in the 21st century because various activities are filled with scientific work products. Science is also inseparable from multiple problems in everyday life; therefore, it is crucial to train scientific literacy skills (Mahardika et al., 2016). Therefore, science education focuses on achieving scientific literacy before children graduate high school, including in Indonesia (Basam, 2022).

Due to the importance of scientific literacy, Indonesia gets involved in the Programme for International Student Assessment (PISA) organized by the Organisation for Economic Co-operation and Development (OECD). Based on the results

of the Programme for International Student Assessment, the scientific literacy of Indonesian students remains below the international mean. More details can be seen in Figure 1.

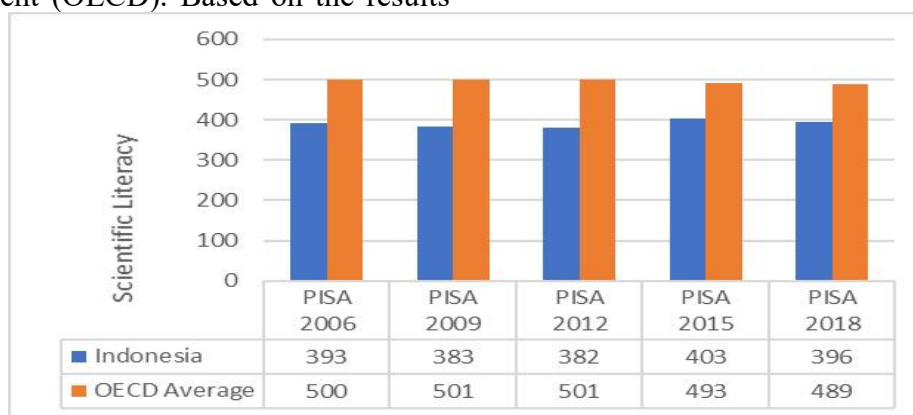


Figure 1. Results of the Scientific Literacy Test for Indonesian Students

The low level of scientific literacy in Indonesia indicates that most students cannot analyze and apply scientific concepts to problem-solving. Several previous studies indicate that internal and external factors affect low science literacy skills. Internal factors include health, intelligence, mentality, student motivation, participation, low reading skills, student relationships with teachers, and learning process organization. External factors include family, friends, teachers, media, facilities, infrastructure, and an unfavorable environment and climate. (Fuadi et al., 2020). Applying constructivist science learning models/methods/strategies enables students to explore their knowledge, learning programs, learning resources, and classroom environment, supporting their scientific literacy skills (Fakhriyah et al., 2017).

The problem-based learning model is recommended for the 2013 curriculum. Problem-Based Learning is a model designed to develop students' problem-solving skills. Problem-solving requires higher-order thinking skills, precisely the capacity to

analyze, synthesize, and evaluate. According to (Ngalimun, 2018), Problem-Based Learning focuses on the selected problem so that learners not only acquire concepts related to the problem but also use scientific methods to solve the problem to cultivate higher-order thinking skills in learners. In addition, research demonstrates that the Problem-Based Learning model can enhance students' critical thinking abilities (Amin et al., 2020; Pia et al., 2021). It is anticipated that students with higher levels of critical thinking can increase their scientific literacy.

In addition to the learning model, another factor contributing to the low level of scientific literacy is the underutilization of learning media. Learning media is an intermediary tool for facilitating communication between teachers and students. Media use is essential because of the strategic position of media for learning success that can arouse interest in learning

motivation, increase student understanding, and help the learning process achieve learning objectives. The media used as a teaching tool include images, slides, photos, films, graphics, and Learning using computers that are useful for capturing, processing, and rearranging obtained visual and verbal information. As a learning aid, the media is also expected to help explain abstract concepts, increase absorption, and provide a direct learning experience to increase students' mastery of concepts and critical thinking. One of the learning media that can be used to improve students' knowledge of concepts and critical thinking is Google Sites-based learning media.

Google Sites is a facility on Google with features as a visiting site. The visit site is managed in the form of a website display that contains text and learning videos. This Google Sites media can be used on the gadget-based web. In this era, Gadgets are beneficial for students in understanding the material because the information needed can be obtained easily and quickly. Learning in schools will be better when combined with Google Sites learning media. Putri et al. (2021) have researched Google Sites teaching media. The result of their research showed that Google Sites-based learning media is exciting to use because it is easily accessible, attracts students' learning interest, makes it easier to comprehend the material, and makes the use of language uncomplicated to understand, according to the level of thinking of students and research

conducted by Sevtia et al., (2022). Using Google Sites-based learning media to enhance high school student's ability to comprehend concepts and engage in critical thinking is feasible, effective, and efficient.

On the basis of the preceding description, the researcher wants to find out the effect of problem-based learning assisted by Google Sites on students' scientific literacy skills at SD Negeri 067251 Medan Deli.

METHODS RESEARCH

This research utilizes Quasi-Experimental Research. The study aimed to determine the effect of the Problem-Based Learning Model assisted by Google Sites on students' scientific literacy by comparing the scientific literacy skills of experimental and control classes. The experimental class employs a Problem-Based Learning Model supported by Google Sites, while the control class uses a direct instruction model. The characteristics of the control and test groups are utilized without altering the existing class structure. (Sugiyono, 2021).

In this study, the quasi-experimental design was a pretest-posttest nonequivalent control group design, which consisted of administering a pretest before treatment and a post-test after treatment to each group. In this investigation, problem-based Learning is the independent variable, while scientific literacy abilities are the dependent variable. The research design is as follows:

Table 1. Research Design

Class	Pretest	Treatment	Post-test
Experiment	O ₁	X	O ₂
Control	O ₃	-	O ₄

Description:

O₁ : Pretest for experimental class

O₂ : Post-test for experimental class

X : Learning using Problem-Based Learning assisted by Google Sites

O₃ : Pretest for control class

O₄ : Posttest for control class

In this study, the population consisted of all fifth-grade students of SD Negeri 067251 Medan Deli, a total of 40 students. The sampling technique used is total sampling; every member of the population is sampled (Sugiyono, 2021). This study's samples comprised 20 students from each VA and VB class. The VA class is an experimental class taught using the Problem-Based Learning Model assisted by Google Sites, while the VB class serves as the control class and is prepared using Direct Instruction Model. The learning model's syntax consists of 1) orienting students to problems, 2) coordinating students, 3) guiding individual and group investigations, 4) developing and presenting works, and 5) analyzing and evaluating the problem-solving proces. Although both classes receive different forms of Learning, the number of meetings in both classes is the same: four. The subject matter is also the same, namely heat and displacement. Pretests and post-tests are held at both classes' initial and final meetings.

The dependent variable in this study is students' scientific literacy. 15 multiple-choice questions with cognitive categories C4, C5, and C6 were used to assess students' scientific literacy. These questions were validated before being used as research instruments. The assessment data were analyzed using Pearson's Product-Moment Correlation test to determine the validity of each item and Cronbach's alpha test to determine the instrument's reliability. The analysis results of each question item indicate that each question item is valid and reliable.

This study's data analysis employed prerequisite analysis tests and hypothesis tests with a significance level of 5% or 0.05 using IBM SPSS Version 26. The required analysis test in the form of a normality test is performed to determine whether or not the data are normally distributed. In contrast, the homogeneity test determines whether or not the research data are homogeneous. The hypothesis test aimed to assess the significance of the difference between the scientific literacy skills of students taught using a Problem-Based Learning Model assisted by Google Sites and a Direct Instruction Model. Tests of the hypothesis are performed using independent samples t-test. Test the hypothesis of science literacy ability in this study as follows.

H₀: There was no difference in the student's scientific literacy skills taught with the Problem-Based Learning Model assisted by Google Sites with the Direct Instruction Model.

H_a: There was a difference in the student's scientific literacy skills taught with the Problem-Based Learning Model assisted by Google Sites with the Direct Instruction Model.

The criteria are:

If the sig. (2-tailed) ≥ 0.05 , H₀ is accepted

If the sig. (2-tailed) < 0.05 , H₀ is rejected

RESULTS AND DISCUSSION

Pretest and Posttest Data

The research data collected for this study result from scientific literacy skills acquired through Learning. Before teaching begins, the control and experimental classes are given pretests to determine their students' scientific literacy skills. Table 2 displays the students' scientific literacy scores based on the findings of the study:

Table 2. The Result of Pretest Data on Scientific Literacy Skills

Class	Value		Mean
	Min	Max	
Experiment	13.33	66.67	32.67
Control	6.67	66.67	32.00

In Table 2, the average value of the control group is 32.00, while the experimental group averages 32.67. The average difference between the two classes is

0.67 points. Based on these data, it can be concluded that students in both sections have comparable scientific literacy skills.

Table 3. The result of Post-test Data on Scientific Literacy Skills

Class	Value		Mean
	Min	Max	
Experiment	60.00	100.00	79.00
Control	40.00	93.33	59.33

Table 3 shows that the experimental class's average post-test score for scientific literacy skills was 79,00, while the average score for the control class was 59,33. This data indicates that students' scientific literacy skills are greater in the experimental class

utilizing the Problem-Based Learning Model with the assistance of Google Sites than in the control class using the Direct Instruction Model. See the following graph for additional information:

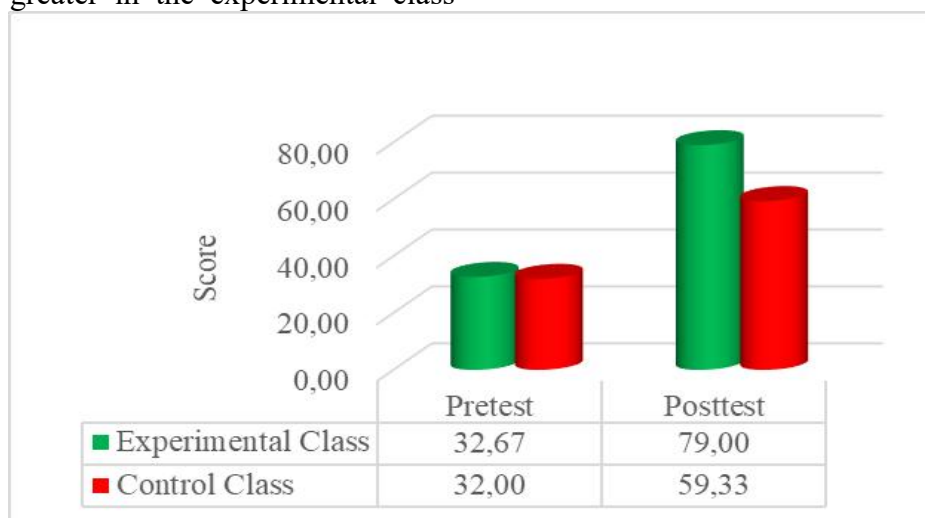


Figure 2. Pretest And Post-test Data Graphs

Before further analysis, normality and homogeneity tests must be conducted. The experimental class's average score on the science literacy pretest is 32.67, while the average score of the control class is 32.00, as shown in Figure 2. According to the pretest results, the science literacy skills of students in both classes are relatively the same. Moreover, post-test data showed that the average science literacy score of the

experimental class was 79,00, while that of the control class was 59,33. Using post-test data, the experimental class obtained the highest score.

Normality Test and Homogeneity Test

The normality test and the homogeneity test are used as prerequisites. The normality test utilizes the Kolmogorov-Smirnov test with a significance level of 0.05 using IBM SPSS version 26. if the sig > 0.05, the data is considered normal. The results of the normality test can be seen in the following table.

Table 4. The Results of The Experimental Class Scientific Literacy Normality Test

Data	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.182	20	.081	.921	20	.104
Posttest	.142	20	.200*	.944	20	.289

Table 5. The Results of The Control Class Scientific Literacy Normality Test

Data	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.129	20	.200*	.959	20	.519
Posttest	.182	20	.082	.928	20	.142

Based on Tables 4 and 5, the significance value is more significant than 0.05 (sig > 0.05), so it can be concluded that the data on students' scientific literacy skills in the experimental and control classes are normally distributed. In contrast, the

homogeneity test determines whether data originates from a homogeneous population by undertaking a homogeneity test with the Levene Statistics test in IBM SPSS version 26. The homogeneity test results are displayed in Table 6 below.

Table 6. The result of the Homogeneity Test

	Levene Statistic	df1	df2	Sig.
Based on Mean	.346	3	76	.792
Based on Median	.376	3	76	.770
Based on Median and with adjusted df	.376	3	72.803	.770
Based on trimmed mean	.335	3	76	.800

Based on the homogeneity test results, Table 6 reveals that the value of sig. = 0.792 > 0.05 indicates that the variance or homogeneity of the data from both classes is identical. After the prerequisite test has been conducted and it has been determined that the obtained data are normal and

homogeneous, hypothesis testing can be accomplished.

Hypothesis Test

The hypothesis test was conducted with an independent samples t-test using IBM SPSS version 26. Table 7 shows the results of the t-test analysis.

Table 7. The Result of Science Literacy T-Test Analysis

Independent Samples Test	
Levene's Test for Equality of Variances	t-test for Equality of Means

	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	.124	.727	4.599	38	.000	19.667
Equal variances not assumed			4.599	36.880	.000	19.667

Based on Table 7, the value of the sig. (2-tailed) for the independent sample t-test is 0.00. Thus, sig. (2-tailed) = 0.00 < 0.05, meaning that H₀ is rejected and H_a is accepted; there is a significant difference between the student's scientific literacy skills in the experimental class using the Problem-Based Learning Model assisted by Google Sites and the control class using the Direct Instruction Model. The experimental class averaged a higher level of scientific literacy than the control class by a difference of 19.67. This shows that at SD Negeri 067251 Medan Deli, the Problem-Based Learning Model assisted by Google Sites increases students' scientific literacy.

There are differences in students' science literacy abilities in experimental and control classes due to the application of different learning models. Zulaiha & Kusuma (2021) stated that the selection of learning methods and models by teachers, learning tools, and teaching materials affects students' low scientific literacy skills in Indonesia. One of the recommended learning models for use in the 2013 curriculum is the problem-based learning model (Hayanah et al., 2019). The problem-based learning model is a learning model that can help students to understand the nature of Learning as a way of thinking instead of just understanding Learning by teachers based on textbooks (Sanjaya, 2008).

The application of the Problem-Based Learning model can develop students' ability to think critically in solving problems and can learn, remember, apply, and continue the learning process independently or in groups (Handayani & Muhammadi, 2020) and students are more confident and

enthusiastic in Learning (Putra et al., 2022). The effectiveness of the problem-based learning model is also seen in learning activities that directly invite students to examine complex problems related to the material, independent and group investigations, and conduct practicums that can provide broader experience related to science literacy which in the context of science literacy emphasizes the importance of recognizing and understanding the context of science applications, and able to apply science in solving real problems they experience. In line with Marni et al. (2019), The Problem-Based Learning Model prepares students to be critical, creative, communicative, innovative, collaborative, and analytical in thinking and able to solve real-world problems effectively.

Scientific literacy is critical in everyday life; this scientific literacy emphasizes mastering concepts, analyzing, concluding, and appreciating the knowledge gained from reasoning. Given the increasingly sophisticated technological advances, scientific literacy learning can be applied to technology-based media. Media is a graphic tool to capture, process, and rearrange information visually or verbally (Anriyani, 2019). Media has an essential role in Learning (Manurung, 2020). Make Learning more focused and exciting so that students have a more significant curiosity in Learning.

Learning with web media is very helpful and motivates students in their

Learning (Astuti et al., 2020; Cahyana et al., 2019). In this study, the media used is Google Sites. Google Sites is one platform that can easily create learning websites without requiring skills such as web coding and web design (Roodt & De Villiers, 2013). Using Google Sites in Problem-Based Learning will encourage creativity, increase curiosity, and train students to think critically and logically. Thus, students' scientific literacy skills can improve.

This research shows that applying the Problem-Based Learning Model assisted by Google Sites affects students' science literacy skills at SDN 067251 Medan Deli. The findings of this analysis are similar to previous studies conducted by Alatas & Fauziah (2020); Darma et al. (2020); Indrawan et al. (2022); Mutiaramses & Fitria (2022). Their studies also prove that applying Problem-Based Learning Model in Learning can improve students' scientific literacy skills.

CONCLUSION

The results showed the value of sig. (2-tailed) In an independent sample t-test smaller than 0.05 (Sig. (2-tailed) = 0.00 < 0.05), meaning that H_0 is rejected and H_a is accepted. Therefore, it can be concluded that Problem-Based Learning Models affect students' scientific literacy skills at SD Negeri 067251 Medan Deli.

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