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THE INFLUENCES OF INQUIRY LEARNING MODEL WITH SCAFFOLDING ON SCIENTIFIC LITERACY AND LEARNING OUTCOMES

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Abstract

The purpose of this study is to analyze the significant effect of the inquiry model with scaffolding on science literacy and science learning outcomes. This type of research uses quasi-experimental and quantitative methods with a non-equivalent posttest-only control class design. The sample was determined using the class random sampling technique within abstract groups with a random technique, and the study population was all 6th-grade students in Cluster II of Blitar Regency. This study used a sample of 48 6th-grade students in the control class of 26 students and 21 students in the experimental class, selected using a random sampling technique. The sample selection criteria were based on students who showed variations in science literacy based on the results of initial observations and discussions with class teachers. The study was conducted in the even semester of the 2023/2024 academic year. Data collection was carried out using tests. The data in this study consisted of quantitative and qualitative data. Quantitative data in the form of student test scores. Qualitative data were obtained through interviews with class teachers and open questionnaires for 6th-grade students. Data collection methods include observations of student learning activities in class, structured interviews with teachers, and document analysis of students' science literacy scores at school. The data were analyzed using statistical tests Anova and Manova. The results showed that the use of inquiry models with scaffolding had a positive effect on the scientific literacy of grade 6 students (the F count of 4.841 is greater than the F table of 4.05), which is equal to 29.742, which is greater than the F table of 4.05). Simultaneously, there is an effect between scientific literacy and the science learning outcomes of students taught using the inquiry scaffolding model, obtained F of 29.0742; p less than 0.05. It is concluded that the use of inquiry models with scaffolding contributes to improving scientific literacy and science learning outcomes.

Keywords Educational research; influence; inquiry; literacy outcomes; scaffolding.

INTRODUCTION

Teachers have the main task of educating, teaching, guiding, directing, training, assessing, and evaluating students in children's education at the basic education level (Afriadi et al., 2023; Maryono et al., 2021). Students need to have basic literacy skills in language, numeracy, science, digital, finance, and civic culture. The government encourages elementary school students' literacy skills and prioritizes the culture of reading, writing, and arithmetic. Reading and writing are what will be included in literacy (Juliana et al., 2023). The project was built to incorporate and stimulate scientific inquiry skills such as identifying a problem effectively, formulating a hypothesis, designing an appropriate experimental procedure, conducting a scientific experiment in a systematic manner, gathering, organizing, and analyzing data, applying statistical methods to support conclusions, and reporting finds (Nasri et al., 2023; Sholihah, 2021). Teachers making improvements in teaching are key to improving students' reading and science literacy, especially considering the lack of science literacy in the country. The main factor in increasing scientific literacy is the way teachers involve students in the learning process. Teachers can create a learning environment based on experiences from everyday life to make learning more fun by integrating scientific literacy knowledge (Nurhanifah & Diah Utami, 2023). Individual skills in understanding information are part of the success of literacy habits in the school environment and are part of the teacher's role and involvement.

Scientific literacy is a skill that must be acquired in planning research activities and applying concepts in real life. Apart from scientific concepts and theories, scientific literacy also requires knowledge of methods and applications related to scientific research. Science literacy is a skill that must be possessed in designing scientific activities and applying the concepts possessed in real life. Science literacy requires not only knowledge of scientific concepts and theories but also knowledge of procedures and applications related to scientific inquiry (Maulidiyah & Wulandari, 2023).

Scientific literacy is very important for every individual because it is closely related to a person's ability to understand and study the environment around him and the problems he faces in today's society, which is very dependent on the development of science and technology, including social problem (A. M. Siregar, 2023). Scientific literacy is very necessary in the era of globalization to adapt to developments in science and technology. Scientific thinking skills are also an important part of scientific literacy and can be improved through the School Literacy Movement (GLS) (Hapsari & Zulherman, 2021). Educators must have sufficient digital literacy to meet the new needs

of today's innovative educational models in the future. Digital Literacy Level, Job Satisfaction, and Professional Role of Teachers (Herlina et al., 2022). This can be realized in the use of science learning models and methods taught by the teacher in learning (Yamin & Syahrir, 2020).

The inquiry model with scaffolding is a learning process that investigates with the help of scaffolding. Learning by inquiry is designed to help students reach the level of carrying out investigations independently. Types of scaffolding students receive in science environments. Scaffolding is the support given to students to be able to achieve scientific thinking (Soonjana & Kaewkhong, 2022). Currently, scientific literacy is considered important for students in developed countries and is taught from an early age in schools (Itaunada & Rachmadiarti, 2023). Students are expected to be actively involved in learning new and interesting concepts in real life. Scientific literacy is defined as the ability to apply scientific knowledge to solve problems. Scientific literacy activities must be implemented in elementary schools (Prasasti & Rahayu, 2023).

PISA identifies and explains the components of the scientific process when assessing scientific competence, explains scientific phenomena that occur around and in nature, applies scientific knowledge to certain situations, explains or interprets phenomena, predicts changes that will occur, and finds appropriate explanations, explanations, and predictions. Based on the results of reporting by development and economic organizations in PISA Indonesia, it has consistently been in the bottom 10 for 18 years without major changes. Literacy is learning that requires the use of reading, logic, research, speaking, and writing to learn complex knowledge content (Abidin et al., 2020). Students acquire scientific abilities as a means of investigation, starting from the lowest scientific abilities to the highest scientific abilities.

Real actions involving behavior and physical objects created by individuals who have culture. Literacy education in schools can strengthen students' interest in reading so that they can expand their knowledge by reading more. In this research, it was found that providing a guided inquiry learning model that the best learning is learning that involves emotions, the whole body, and all the senses, and respecting other individuals' learning styles by realizing that other people learn with different styles (Wiraputra et al., 2023).

The facts in the field of this gap can be used by researchers to answer questions about students who have difficulty applying scientific literacy to science subject matter because teachers have not accustomed children to thinking scientifically and find other factors that need to be researched. The scientific literacy abilities of Indonesian students are still less than encouraging

(Suprianti et al., 2021; Yasa et al., 2022)l. In fact, scientific literacy is a skill that is absolutely needed in the postmodern era, and the scientific literacy movement has been implemented at all levels of education, from elementary school to high school (Cahyani & Suryani, 2023).

The results of observations at UPT SDN Kaweron 02 Blitar show that the school aims to improve literacy traditions, both reading literacy and scientific literacy, in order to stimulate interest in learning, tolerance, cooperation, respect, discipline, integrity, hard work, creativity and independence. to students. These efforts can improve the ability to solve daily life problems using scientific knowledge. Among the indicators of scientific literacy are scientific argumentation, literature validation, scientific information, experimental design, making graphs, data interpretation, problem-solving, basic statistics, and inference (Mardianti, 2020).

The results of the research (Suprianti et al., 2021) Show that the implementation of scientific literacy traditions at SDN Bandungrejosari 2 Malang City, starting from planning, implementing, and evaluating scientific literacy culture in science learning combined with the use of interactive multimedia, is able to improve student learning outcomes. In line with research conducted by (Irsan, 2021) Scientific literacy skills can increase significantly if supported by the use of video media in learning. Improving students' science process abilities by using an inquiry model assisted by scaffolding in the learning process will increase students' problem-solving abilities. (Itaunada & Rachmadiarti, 2023) Search is different from other research, where this research focuses on analyzing teacher involvement in the reading literacy and science literacy traditions of Grade 6 Elementary School Students. Based on the explanation above, the aim of this research is to analyze the significant influence of the inquiry model with scaffolding on scientific literacy and science learning outcomes in grade 6, and not all teachers understand the importance of scientific literacy in learning (Aripin & Ikrom, 2022). Appropriate problem-solving in learning is a real form of students' scientific literacy abilities, which have an important role in continuing to improve at the basic level, requiring scaffolding to help students (Tristiantari et al., 2023).

Based on the research reviewed, it can be concluded that the integration of scientific literacy traditions with interactive multimedia in elementary science education has proven effective in enhancing student learning outcomes, as demonstrated at SDN Bandungrejosari 2 Malang City. Studies indicate that supporting scientific literacy with video media and scaffolding within inquiry-based models notably improves students' problem-solving skills and science process abilities. However, there remains a need to increase teacher understanding and engagement in fostering

scientific literacy. The findings underscore the importance of inquiry models with scaffolding as a means to strengthen scientific literacy and science learning outcomes in elementary education, particularly in Grade 6, as they provide the necessary support for developing critical thinking and problem-solving skills at this foundational level.

METHOD

This type of research uses Quasi-Experimental and quantitative research with a non-equivalent post-test only control class design. The sample was determined using the class random sampling technique within abstract groups with a random technique, and the research population was all 6th-grade students in Cluster II of Blitar Regency, totaling 104 students**.** Equivalence tests are carried out before selecting samples in odd semesters. The sample was then determined using the class random sampling method as a group concept using a lottery technique. Two draws were conducted, and the first step was to identify the study sample. Next, eight schools in cluster 2 that had the same qualifications were selected from two classes as a random sample. After the two sample groups were known, a draw was carried out to determine the experimental and control classes. The sample was determined using class random sampling techniques in abstract groups using random techniques.

Randomization was carried out twice, and the first step was to determine the research sample. Next, nine comparison schools were sampled to determine the two classes and sampled again to determine the experimental and control classes. The research design used was a non-equivalent post-test control group design. The research population was all 6th-grade students of Cluster II Blitar Regency, totaling 104 students. The sample was determined using a random sampling technique for classes as a group concept using a lottery technique. The research group only consisted of 22 grade 6 students at UPT SDN Kaweron 02 Blitar. A random sampling technique with a group approach and a lottery technique were used to determine the class sample. The drawing results were determined by UPT SDN Jeblog 02 Blitar, totaling 26 students as the experimental class. Meanwhile, SDN Kaweron 02 Blitar is a control class with 22 students. Science literacy data was collected using the essay test method, and data on student science learning outcomes was collected using a multiple-choice test. Data were analyzed using One Way Anava (Anova A) to test the first and second hypotheses, then the Manova test to test the third hypothesis. Calculations using the SPSS 22.0 for Windows program. This research was conducted with independent funding sources

from the researcher. Before data collection is carried out, approval is requested from the school and the students who will carry out the research. The data sources used in this research are student pre-test and post-test scores, observation lists or field notes, LKPD, questionnaires, interviews, and assessment tools and documentation. The hypothesis of this research is that there is a difference in the scientific literacy abilities of students in the experimental class using the inquiry model with scaffolding and the control class, which uses the inquiry model.

FINDINGS AND DISCUSSION

Findings

The research was carried out with the aim of finding out the effect of the inquiry model with scaffolding on scientific literacy and science learning outcomes in class 6 of UPT SDN Kaweron 2 Blitar for the 2023/2024 academic year. The sample in this research was 28 class 6 students of UPT SDN Kaweron 1 Blitar, UPT SDN Kaweron 2, UPT SDN Jeblog 1 as many as 26 students UPT SDN Jeblog 2 as many as 26 students. The four classes were given four meetings, and at the 5th meeting, a posttest was given. The following is a description of the data measuring the average, median, standard deviation mode, average, minimum, and maximum values for the experimental class and control class.

The presentation of the results of this research shows the role of teachers in cultivating the scientific literacy of grade 6 students, starting from planning to implementing learning, increasing the average of students' science skills, namely with an average of 82.27 (very good), in elementary school, become the basis for teachers in the science learning process in the classroom. In line with the research results of the following researchers, it shows that teachers need to know, understand, and interpret the components of scientific literacy skills in the experimental class better than in the control class, obtaining an average of 82.27 (very good) and 78.85 (good) in the control class. Second, student learning outcomes in the experimental class were better than those in the control class.

Table 1. Summary of First Hypothesis Test

ANOVA

Variabel	A 1		A2	
Statistik	Y1	Y2	Y1	Y2
N	26	22	26	22
Mean	78,85	82,27	71,73	83.86
Median	80,00	85,00	70,00	87,50
Modus	80,00	154.113	75,00	80,00
Standar Deviasi	13.290	12.414	11.309	11.226
Varians	176.615	154.113	127.885	126.028
Range	35	35	35	35
Minimum	60	60	60	60
Maksimum	95	95	95	95

Table 2. Science Literacy

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	139.918	1	139.918	4.841	.004
Within Groups	7651.748	46	166.342		
Total	7791.667	47			

Based on the results of the analysis in Table 3, the calculated f result is 29.742, while the f table is significant at 0.05 = 4.05, so the analysis results show that the calculated f is greater than the f table, the meaning of Ho is rejected, and H1 is accepted, so it can be concluded that there is a significant influence on the inquiry learning model with scaffolding on the learning outcomes of grade 6 students in the 2023/2024 school year. The results of the third hypothesis test can be seen in Table 4 below:

Tabel 4. Result of Manova Test Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.983	1284.013[b]	2.000	45.000	.000
	Wilks' Lambda	.017	1284.013[b]	2.000	45.000	.000
	Hotelling's Trace	57.067	1284.013[b]	2.000	45.000	.000
	Roy's Largest Root	57.067	1284.013[b]	2.000	45.000	.000
Groups	Pillai's Trace	.260	7.924[b]	2.000	45.000	.001
	Wilks' Lambda	.740	7.924[b]	2.000	45.000	.001
	Hotelling's Trace	.352	7.924[b]	2.000	45.000	.001
	Roy's Largest Root	.352	7.924[b]	2.000	45.000	.001

a. Design: Intercept + Groups
b. Exact statistic
c. Computed using alpha = ,05

Based on the results of the MANOVA analysis in Table 4, it is known that the price sig. For Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root is smaller than 0.05. Thus, H0 is rejected, and H1 is accepted, so there is a simultaneous influence between scientific literacy and science learning outcomes of students who are taught using the inquiry model with scaffolding for grade 6 students at UPT SDN Kaweron 2 and UPT SDN Jeblog 02 Blitar, Academic Year 2023/2024.

The average post-test results in the experimental class that used (Literacy movement) reading and writing literacy in the research showed an average of 81.00 in the experimental class and 67.20 in the control class (Juliana et al., 2023). The results of the next study showed that the pretest score showed that the average student score was 50 and the posttest score was 87 and obtained the N-Gain criterion of 0.74 with a high category. (Febrianti, 2021) From the results of the research above, it can be concluded that scientific literacy can increase the average class of students.

Discussion

Based on the findings, the inquiry learning model with scaffolding increases scientific literacy because, in the learning process, the inquiry model with scaffolding is able to utilize students' physical and psychological senses. This can be proven through students' activities of listening carefully to what the teacher explains and then students actively exploring information either through discussions, working on LKPD, or conveying back the results of their discussions. Science competency in elementary school is the basis for student competency at a higher level (Handayanto et al., 2020). Based on research results, the use of the discovery model also has an influence on students' literacy skills, and this model is almost similar to the inquiry model (Hartati & Ulfa, 2022).

Learning scientific literacy at UPT SDN Kaweron 02 Blitar, apart from providing hope that students can find and determine questions that arise from curiosity related to experiences in everyday life, can predict phenomena that occur, carry out social skills that involve the ability to read and understand knowledge obtained, then be able to solve problems, students are also expected to be able to know and understand the concept of scientific literacy and the processes applied in real life. Literacy skills can be seen in changes in students' behavior who are able to know, understand, and interpret so that they are able to think logically according to reality, solve problems, draw conclusions according to evidence or reality, and apply science in a real way. life (Muliastrini, 2019). These results are not visible in the form of numbers or symbols like in general assessments.

Based on the results of observations, it can be said that the implementation of scientific literacy training at UPT SDN Kaweron 02 Blitar has carried out scientific literacy training. In the initial assessment aspect, most of the supporting facilities at UPT SDN Kaweron 02 Blitar do not yet have a science laboratory as a learning resource, and not all classes have a reading corner that can be used as the main learning resource. Science learning is directed at carrying out investigative activities and is introduced to the use of the inquiry model with scaffolding through familiarization and the use of LKPD. According to research, learning using an inquiry model assisted by scaffolding and the habit of scientific thinking can have an influence on students' scientific literacy and student learning outcomes and sufficient digital literacy to meet the new needs of today's innovative educational models in the future. Digital Literacy Level, Job Satisfaction, and Professional Role of Teachers (Santi Ariani Rambe, 2022).

The role of teachers in cultivating the scientific literacy of grade 6 students in planning learning in elementary schools. There are a number of research studies related to the development of science learning modules based on scientific literacy for grade 6 elementary school students, as well as teacher strategies for improving students' scientific literacy skills. The results of this study are consistent, showing that the development of science learning modules based on scientific literacy and learning strategies of inquiry, experimentation, and observation is proven to be able to improve students' abilities and concepts in scientific literacy (Erniwati et al. 2020).

Science learning modules based on scientific literacy can also increase students' interest in learning (Pratiwi et al. 2019). Teachers have an important role in improving students' scientific literacy skills. Students will learn more actively if teachers are able to provide them with a fun and interesting learning environment. To improve students' conceptual understanding, teachers must also help them learn how to ask effective questions and provide constructive criticism (Laksana et al., 2019). There are several studies related to the development of science learning modules based on scientific knowledge for 6th-grade elementary school students, as well as teacher strategies to improve science reading skills. (Muliastrini, Nyoman, and Rasben 2019). The results of this study are consistent, showing that the development of science learning modules based on scientific literacy and learning strategies of inquiry, experimentation, and observation is proven to be able to improve students' abilities and concepts in scientific literacy (Ketut et al. 2019; Amri 2020). Science learning modules based on scientific literacy can also increase students' interest in learning (Dwipayani et al., 2023).

This research led researchers to conclude that teachers play an important role in increasing scientific literacy among grade 6 elementary school students through the activity of getting used to scientific literacy at the UPT SDN Kaweron 02 Blitar school. To increase students' scientific intelligence and interest in learning, teachers need to design effective learning strategies. There are a number of studies related to the development of science learning modules based on scientific literacy for grade 6 elementary school students, as well as teacher strategies in improving students' scientific literacy skills (Aripin & Ikrom, 2022).

The results of this study are consistent, showing that the development of science learning modules based on scientific literacy and inquiry, experimentation, and observation learning strategies is proven to be able to improve students' abilities and concepts in scientific literacy. The science-based learning approach and the role of a good teacher can influence students' scientific literacy abilities and interest in learning in a beneficial way. This study has led researchers to conclude that teachers play an important role in promoting a culture of scientific literacy among classroom students 6 in elementary school (Ningrum, Coesamin, and Sasmiati 2019). To increase students' scientific intelligence and interest in learning, teachers must design appropriate learning strategies.

CONCLUSION

The role of teachers in the culture of scientific literacy in inquiry model learning with scaffolding has a significant influence on students' learning literacy and learning outcomes. For this reason, it is necessary to continue to improve teachers' abilities in planning learning, including curriculum development, preparation of lesson plans, selection of learning materials, selection of learning methods, and making devaluation tools. The teacher's role in implementing scientific literacy includes (1) carrying out reading activities 15 minutes before class, (2) implementing student-centered learning, and (3) participating in direct learning activities. (4) Developing scientific literacy-based teaching modules as a practical tool for students with low parental interest, low student awareness and interest, and low learning facilities. These obstacles have an impact on lessthan optimal learning and low quality of education. The way teachers overcome obstacles in developing science competencies includes how teachers fulfill their role in providing existing teaching. The problem of minimal practical school facilities can then be overcome by handing them over to the government and independent donors.

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