Journal of English Language and Education
ISSN 2597- 6850 (Online), 2502-4132 (Print)
Journal Homepage: https://jele.or.id/index.php/jele/index

OPEN ACCESS Article

The Effect of the Problem Based Learning Model on Science Process Skills in Science Subjects in Class IV at the Kepong Learning Studio Malaysia

https://doi.org/10.31004/jele.v11i1.1879

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A B S T R A C T

Education plays a crucial role in enhancing the quality of human resources and fostering productive individual development. Through education, individuals gain the ability to transform their lives and contribute meaningfully to society. High-quality human resources are essential for national progress, and science education at the primary level is particularly important in developing students' thinking skills, problem-solving abilities, and latent potential. This study aimed to examine the effect of the problem-based learning (PBL) model on students' science process skills in Grade IV science lessons at the Kepong Learning Centre, Malaysia. A quantitative approach was employed, and data analysis revealed a significance value of 0.000, indicating that the alternative hypothesis was accepted while the null hypothesis was rejected. These findings demonstrate that the implementation of the problem-based learning model has a significant positive effect on students' science process skills in primary science education.

Keywords: *Problem Based Learning, Science Process Skills, Primary School, Science Learning*

Article History:
Received 19th December 2025
Accepted 25th January 2026
Published 27th January 2026

INTRODUCTION

Education signifies that a child has self-control, character, intelligence, religious beliefs, and a noble sense of morality. The reasons, or physical and mental motivations, that are necessary for a person to undergo the learning process are the main questions in educational activities. In order for the learning process to run smoothly, students also have responsibilities. The goal of students is to become a better person and be able to apply the knowledge gained through the educational process in the future. Learning is a process that brings about continuous behavioral change: Ignorance turns into knowledge, ignorance into understanding, inability into ability, old habits into new habits. It is beneficial for the environment and individuals (Permata & Pratiwi, 2024).

Education is an activity that improves the quality of human resources and encourages individual growth. Through education, people can bring about change in their own lives and gain the ability to contribute to society. High-quality human resources are irreplaceable for the country. . In education, enriching learning content is very important. Science education is an example. The goal of science education is for students to acquire scientific abilities. Scientific thinking skills are an irreplaceable ability in modern society and are an important element in science education. Students must master advanced thinking skills such as creative thinking, critical thinking, collaborative thinking, and communication. Therefore, creative thinking is an important component of science education and basic literacy that is essential for the 21st century (Rahmanati, et al., 2025).

Education plays a very important role in the country and the lives of its citizens. Education is irreplaceable in forming individuals who are able to face the challenges of this

era. Science education plays a role as a means to improve the quality of these individuals (Siagian, et al., 2024).

Teachers require students to memorize the subject matter and information during the lesson. This means that students' brains must be able to remember the content being taught. It is important for modern students to develop scientific thinking. The scientific method refers to the ability to understand, develop, and find knowledge using a scientific approach (Yuni Angelia, 2022). Science process skills are very important in the natural science learning process. This is because these skills help achieve the learning goals of the natural sciences. As a result, students are less likely to feel bored during learning activities (Permata & Pratiwi, 2024).

According to Nash, natural science (IPA) is an approach that observes nature thoroughly and in detail. This results in a new perspective on the object of observation. Therefore, natural science is a field that studies what has been observed. Natural science (IPA) is "a field of study that systematically investigates natural phenomena based on the results of human experiments and observations." Science can also be viewed, literally, as a subject that provides students with the ability and opportunity to think critically and objectively. Therefore, the teaching of natural sciences is very important in elementary schools. The natural sciences have the potential to strengthen students' thinking skills, problem-solving abilities, and hidden potentials (Rahmanati, et al., 2025).

In the 21st century, science process skills are very important. These skills are part of the learning process and represent the complex abilities that scientists use when conducting scientific investigations. Science process skills are patterns of behavior designed to facilitate new discoveries. In reality, students' science process skills decline because they perceive science as a difficult subject and feel bored of learning only through theory. In addition, students lose interest in science because the media and approaches used by teachers are less innovative (Yumniya & Handayani, 2025)

Trianto science education process, with a focus on the process skills approach, students can build concepts and theories, find facts and develop scientific attitudes. Ultimately, this approach has a positive impact on the quality and outcomes of the educational process. Systematic science learning activities develop students' ability to ask questions about 'what', 'why', and 'how', understand, and find answers. These methods can be applied to both technology and the environment. Failure to achieve learning objectives can indicate the extent to which students understand the subject matter. Various factors can contribute to a low level of understanding. The use of inappropriate learning models and lack of diversity are some of these factors (Rahmanati, et al., 2025).

Science education should include attitudes, processes, outcomes, and application. The main goal is to allow students to experience the entire learning process in understanding natural phenomena. Through problem-solving activities, they apply a scientific approach, mimicking the processes that scientists use to produce new discoveries. Science education today emphasizes too much on memorizing terms such as concepts, theories, and laws, often focusing too much on the process of learning to memorize. As a result, attitudes, processes, and applications do not receive enough attention during the learning process. Learning in the classroom has proven inadequate to equip students with the necessary skills and basic literacy (Sandi, et al., 2024)

Science process skills are divided into basic process skills and integrative process skills. Measurement, observation, classification, communication, interpretation (drawing conclusions), and prediction (forecasting) are basic process skills. On the other hand, integrated process skills can be applied in a variety of areas, including data interpretation, hypothesis formulation, experimental design, and definition of operational variables. Students are expected to master process skills such as observation, classification, measurement, prediction, drawing conclusions, communication, controlling variables, and conducting experiments (Yumniya & Handayani, 2025).

However, in reality, teachers struggle to provide learning that challenges students with problems. This is because educators have not developed an appropriate learning model. As a result, students may feel bored or lose interest in learning. The implementation of appropriate learning models has a significant impact on the success of teachers' learning activities. Therefore, educators can choose a suitable learning model to achieve their goals. (Siagian, Manalu, & Siahaan, 2024).

Science process skills refer to scientific investigation activities carried out by students with the aim of acquiring scientific knowledge and abilities. Science process skills education is essential for students to gain the ability to observe objects and phenomena, formulate questions, construct explanations, and verify those explanations based on scientific knowledge, and share ideas with others. Science Process Skills refer to the competencies students acquire to explore, develop, and make discoveries through scientific activities. Therefore, the application of an educational model is needed to improve students' science process skills and increase their motivation towards scientific attitudes and thinking (Sandy, et al., 2024).

Based on the results of observation, the problem found is the low skill of the science process in science learning. Students tend to be passive and less active and difficult to understand concepts in depth and rarely engage in problem-solving because learning is still focused on the teacher. Teachers tend to use conceptual learning models which also make it difficult for students to understand science process skills. This is the background for this research.

By leveraging the learning model, we have addressed these issues. The application of the right learning model. A learning model is a framework for carrying out learning activities systematically that support students and teachers in achieving learning goals. Products and processes are two aspects of the learning model (Afdani, et al., 2024). The learning model that allows all students to actively participate in the learning process is the *problem-based learning model*.

According to (sari, et al., 2025) this approach combines Problem-Based Learning (PBL) with the methodology of Critical Process Skills. This model encourages students to develop critical thinking, cooperative skills, and active involvement in solving real-world problems. Through this method, students learn to identify problems, find potential solutions, and develop independent and creative thinking skills.

According to Glazer , *Problem Based Learning* is to strengthen skills such as critical thinking, problem-solving, and cooperation to overcome complex real-world problems of information collection and processing, as well as interpersonal communication. According to Gagné, it is stated that the mastery of scientific concepts and principles is only possible through the mastery of scientific process skills, which are essential for the application of science (sari, et al., 2025).

The foundation of PBL theory is Collaborative learning In collaborative learning, students organize their own knowledge and form new knowledge through cooperation with others. This also signifies a shift in the learning process from the transmission of information from facilitators to students towards the construction of social and personal knowledge. In addition, it shows a shift in the learning process from facilitators who convey information to students towards the construction of social and personal knowledge. Savery emphasized the importance of teamwork. Because the workplace of the future requires collaboration in teams, PBL ensures that information is shared among all group members and handled cooperatively. In addition, PBL adopts the principle of constructivism, which states that humans can only understand things through their own construction. (Waldohuakbar, et al., 2023).

According to Ramadhan, et al. *Problem Based Learning* (PBL) is a PBL (Problem-Based Learning) Model that focuses on the problem-solving process. We identify problems and look for solutions. By using the PBL model, students can improve their skills through the science learning process. Currently, students are working on their assignments (Hindayanti, et al., 2024).

The problem-based learning *model* is based on the principle that students learn in groups working with their teachers. This model uses daily challenges to strengthen students' critical thinking skills, problem-solving skills, and ability to find answers on their own (Aisyah & Gumala, 2025). This model encourages students to tackle problem-solving when teachers face challenging situations. *Problem-based learning* (PBL) strengthens students' critical thinking and problem-solving skills, allowing them to understand key concepts and principles in the subject. Problem-based learning is applied in the context of real-world problems (Aprina, et al., 2024).

According to the Ministry of Education and Culture, 2013 in Haryanti explained that *problem-based learning* is a learning model that motivates students by presenting context-based problems. The benefits include improved critical thinking skills, independence, the formation of interpersonal relationships in group work, and increased intrinsic motivation to learn. Research applying the PBL model in education has shown positive results. Problem-based learning (PBL) is a method of learning about real-world problems. The purpose of this methodology is to develop critical thinking skills, curiosity, problem-solving skills, independence, and independent learning skills in students (Afdani, et al., 2024).

Samantha stated that this *Problem Based Learning* (PBL) learning model uses a hands-on approach. This method requires students to complete realistic problem-solving tasks, develop high-level thinking skills, increase their independence, and foster confidence. In this learning approach, students are faced with problems and given guidance on how to solve them. During this process, students must master basic thinking skills, gain confidence in problem solving, and learn how to find solutions (Hikmah, 2025).

This research is accompanied by practical activities of planting plants. This is because one of the effective ways to teach children about environmental concepts is to plant plants. Through this practice, children learn about the growth process, understand the importance of caring for plants and understand how a healthy environment supports life. Planting sprout seeds into beans is a popular choice because they are easy to grow, grow quickly, and allow for the prioritization of daily changes. This allows children to experience concrete and fun learning (Izzah, et al., 2025).

The purpose of this practice is to observe the development process of mung bean seed sprouts and compare the growth of mung bean seeds in light or dark places. To carry out this practice, several tools and materials are needed, namely:

Green bean seeds (about 10 seeds)
2 plastic cups used for drinking water
Cotton
Clean water
Thick paper and markers
Notebooks and stationery

After all the ingredients and tools have been prepared, the steps in planting sprout seeds into beans, namely:

Soak the mung bean seeds for 2-3 hours to ensure the seeds are good and ready to grow
Take 2 plastic cups and label the other glass as "light" and "dark"
Put the cotton clumps in both glasses. Wet the cotton swab with enough water to keep it moist but not to the point of stagnation
Put 10 green beans on a cotton swab in each glass. Space between each seed so that it is not too close
Place glasses labeled "bright" in a place where they are exposed to direct sunlight, such as in the yard. Place glasses labeled "dark" in a dark place, such as in a closet or under the bed
Water the cotton swab daily with enough water to keep it moist. Do not let the cotton swab dry too dry or get wet

Observe for 5-6 days. Record any changes that occur to the seeds, such as the appearance of roots, buds and stem growth each day in a notebook
The growth of mung beans into bean plants normally takes 4 days.

On the first day, from the seeds, small stems of green beans begin to grow. On the second day, the stem begins to lift and begins to remove the seeds. On the third day, the leaves begin to appear as buds. On the fourth day, the seeds have come off the leaves and the stems begin to straighten towards the direction of light. On the fifth day, the growth on the leaves begins to widen and the stems look larger. On the sixth day, the lower trunk begins to firm and the roots can be seen to increase in number. And on the seventh day, the stems, leaves and roots are good and ready to grow bigger.

The purpose of this study is to find out the effect of the use of *problem based learning model* on the skills of the Science Process in science subjects in grade IV at the Kepong Learning Studio Malaysia.

METHOD

The research used in this study is quantitative research. According to (Sugiyono, 2021, p. 17) quantitative research is a research approach based on the philosophy of positivism and applies quantitative methods to a specific sample or population. Data is collected using survey tools and analyzed using statistical elements. The research design consists of pre test and post test. This study involved all grade IV students (7 students).

The data collection technique of this study is a test with 15 multiple-choice questions. Before being given treatment, the researcher gave the question sheet as a pretetst and after being given the treatment, the researcher returned to the question sheet as a postest.

Data testing using IBM SPSS 26. The significance value is 5% If $\alpha < 0.05$ then Ha is accepted, If $\alpha > 0.05$ then Ha is rejected Description:

Ha : The influence of *the Problem Based Learning* learning model on Science Process Skills in science subjects in grade IV at the Kepong Learning Studio Malaysia.

H0 : There is no effect of *the Problem Based Learning* learning model on Science Process Skills in science subjects in grade IV at the Kepong Learning Studio Malaysia.

FINDINGS AND DISCUSSION

Research Results

Science process skills data were collected using an essay containing 15 items. The pre-test results for science process skills averaged 57 points, while the post-test results averaged 87 points. This shows an improvement in science process skills using *the Problem Based Learning Model*.

Next, a normality test was carried out using IBM SPSS 26.

Table 1.
Tests of Normality

	Kolmogorov Statesmen c	- Df	ıirnova Say.	Shapiro-Wilk Statesmen c	df	Say.
Priest st	.194	7	.200*	.948	7	.710
Position st	.313	7	.037	.836	7	.091

*This is a lower bound of the true significance. a. Lilliefors Significance Correction

As a criterion for testing normality, data exceeding 0.05 may follow a normal distribution. Based on the table above, with sig values of 0.710 and 0.091, we can Concluding that data It follows a normal distribution. Next, a t-test or hypothesis is carried out. In this t-test, one sample t-test is used

Table 2.
One-Sample Test

Test Value = 0

	T	Df	Sig. (2tailed)	Mean Differen ce	95% Confidence Interval of the Difference Lower	Upper
Ready is	23.0 17	7	.000	57.143	51.07	63.22
Post est	39.7 63	7	.000	87.571	82.18	92.96

Decision-making on the t-test or hypothesis test, if the sig value < 0.05, then Ha is accepted and H0 is rejected. Based on the table above, the value of sig 0.000 is obtained. it can be concluded that Ha is accepted and H0 is rejected. That means, there is an effect of the use of *the problem-based learning model* on the skills of the Science Process in science subjects in grade IV at the Kepong Learning Studio Malaysia.

Discussion

According to (Hindayanti, et al., 2024) the *Problem Based Learning* model can be one of the approaches to improve process skills and learning skills. The PBL model focuses on how students solve problems based on their own awareness of the issues at hand. The PBL learning model emphasizes the process of students' full participation, allowing them to discover learning content independently and connect it to their daily lives.

According to (Hikmah, 2025) *Problem-based learning* has five fundamental characteristics. First, Problem-Based Learning (PBL) with a learning method that focuses on problem solving. Second, emphasize on problem solving. Third, student-centered. Fourth, integrating independent learning. Fifth, *the problem-based learning* (PBL) model is reflective. The use of PBL's *problem-based learning* model allows students to identify problems, gather relevant information, and find new solutions through group discussions.

Science process skills provide students with the opportunity to develop problem-solving skills. Angela explains four reasons why the scientific process skills approach is so important in the learning process. First, along with the rapid advancement of science, teachers must be equipped with the ability to deliver education that can adapt to these advances. Second, when learning activities provide concrete examples, students may have an easier time understanding the concepts. Third, scientific discoveries are not definitive and may change along with new information or data. Fourth, the development of ideas should be considered independently of the student's attitudes or beliefs. On the contrary, it is important to develop individuals who are equipped with intellectual and social competencies (Hikmah, 2025).

This model shows how students develop a sense of social solidarity through discussion, form habits in identifying and solve problems, and become accustomed to using experimental methods. The use of PBL makes students more enthusiastic in learning. *Problem based learning* (PBL) is a learning model that encourages students to work together in solving real-world problems and understanding their own learning methods. In addition, PBL is considered the highest level of the learning model, as it develops the ability to solve real problems and come up with ideas using investigative skills (Afdani, et al., 2024).

Based on the results of the research obtained in the hypothesis test with a sig value of 0.000, there is an effect of the *problem-based learning model* on the skills of the Science Process in science subjects in grade IV at the Kepong Learning Studio Malaysia.

This is in line with the research conducted by Putri Nur Permata and Indah Pratiwi (2024) with the research title "The Influence of Animation Video Media on Students' Science Process Skills in Class V" with the achievement of researchers conducting hypothesis tests to determine whether there are effects before and after the use of animated video media. Based on the test results, the results of the hypothesis test on the independent sample t-test concluded that both the alternative hypothesis Ha and the zero Ho hypothesis are acceptable, because the Sig value in the two-tailed test is 0.000 < 0.05. This means that after using animated video

media, there is an influence on the science process skills of grade V students of SD Negeri 054949 Sei Meran Pangkalan Susu.

CONCLUSIONS

Based on the results of data analysis, it can be concluded that the use of the Problem Based Learning (PBL) learning model has a significant effect on science process skills in science subjects of grade IV students at Sanggar Belajar Kepong, Malaysia. This is proven through a hypothesis test that shows a significance value of 0.000, so that the alternative hypothesis (Ha) is accepted and the null hypothesis (H0) is rejected. Thus, the application of the PBL model is effective in improving students' science process skills. Therefore, this research is expected to make a positive contribution to the learning process and become a reference and guide for future researchers who want to examine similar variables or learning models.

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