



The Influence of the Probalusan Learning Model on the Attitudes and Science Learning Outcomes of Grade VIII Students at SMP Negeri 6 Sentani, Jayapura Regency

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Abstract: Science is a fundamental discipline that aims not only to transfer factual knowledge but also to develop critical, logical, and analytical thinking skills in students. This study aims to analyze the effect of the Probalusan learning model (Problem-Based Learning and Susan Loucks Horsley based on problem solving, discussion, and collaboration) on the attitudes and learning outcomes of eighth-grade students of SMP Negeri 6 Sentani. The Probalusan model was chosen because it has the potential to increase active student participation, foster curiosity, and facilitate the understanding of science concepts through solving real problems. This study uses a quantitative approach with a quasi-experimental design, namely a pretest-posttest control group design. The study population was all eighth-grade students, with two classes selected as samples: one experimental class using the Probalusan model, and one control class using conventional methods. The instruments used included a learning attitude questionnaire and a science learning outcome test. Data analysis was carried out using statistical tests, namely normality, homogeneity, t-test, and N-Gain tests. The results of the t-test on the posttest data showed a significant difference between the control class and the experimental class. The results showed that science learning using the Probalusan model can improve students' attitudes and learning outcomes.

Keywords: Attitude; Learning outcomes probability; Science; Sentani

Introduction

The Probalusan learning model is a combination of Problem-Based Learning and Susan Loucks-Horsley. The application of the Probalusan model in science learning at the junior high school level in Jayapura City has a positive impact on students' knowledge, attitudes, and science process skills (Perdana et al., 2022; Pieter & Risamasu, 2025). The Probalusan model has been introduced as an innovative learning model in science learning. Training for MGMP Science teachers in Jayapura City demonstrated that implementing the Probalusan model can create more active and enjoyable

learning and improve teachers' skills in conducting innovative learning (Rehiara, 2025; Kadmayana et al., 2021). Problem-Based Learning (PBL) has been shown to significantly improve students' creative thinking skills in various educational contexts. Research by Astuti et al. (2024), Rosiningtias et al. (2023), showed that the PBL model has a positive impact on science learning outcomes for junior high school students. Similarly, research by Sutrisna et al. (2022), Martin et al. (2025) demonstrated that the PBL model has an impact on science learning outcomes of eighth-grade junior high school students. By engaging students in real-world problems, PBL encourages independent knowledge

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construction and the development of critical and creative thinking skills. The application of the PBL model to junior high school students has been shown to significantly improve cognitive and creative thinking abilities (Duda et al., 2024; Setyani et al., 2024). Creative thinking skills significantly assist students in solving problems in everyday life (Mz et al., 2021; Susilawati et al., 2021; Affandy et al., 2024). Creative thinking skills are essential for students to compete globally when entering the workforce.

Science education is an essential foundation for developing scientific literacy and higher-order cognitive skills, including critical thinking and problem-solving, which are crucial in the information age (García-Carmona, 2025; Sari et al., 2025; Wiwik Ernawati et al., 2023). However, the quality of science learning in many contemporary educational contexts faces substantial challenges. Learning often focuses on memorization and the one-sided transmission of knowledge, thus failing to foster active student engagement and the transfer of concepts to real-world contexts (Žakelj et al., 2024; López-Fernández et al., 2023) This condition results in suboptimal student cognitive learning outcomes and, more importantly, hinders the development of positive scientific attitudes, such as curiosity, perseverance, and objectivity. Low cognitive learning outcomes and less proactive attitudes are strong indications that traditional learning methods are no longer adequate to achieve holistic science education goals (Kunnath & Botes, 2025). Research shows that student-centered and constructivist learning models can improve students' conceptual understanding and self-efficacy (Indriyani et al., 2022; Oise et al., 2025). Therefore, innovative models specifically designed to integrate cognitive and affective development are needed.

The SLH learning model reflects the simultaneous integration of science and technology. Through the four stages of the SLH learning model: invite, explore, discover and create, propose explanations and solutions, and take action, students are directly exposed to objects and their uses. The application of the SLH learning model in science learning can foster excellent constructivist learning by accommodating the five domains in the science education taxonomy. This study aims to test and analyze the influence of the Probalusan model on the attitudes and science learning outcomes of class VIII students of SMP Negeri 6 Sentani.

Method

This research is a quantitative study with a quasi-experimental design using a pretest-posttest control group design (Sumiantari et al., 2019) conducted at SMP Negeri 6 Sentani, Jayapura Regency. Two classes were

selected by purposive sampling, namely the experimental class (class VIII C) and the control class (class VIII B). The number of students in class VIII C as the experimental class was 28 students, and class VIII B as the control class was 30 students. This study used instruments in the form of a questionnaire on learning attitudes and tests of science learning outcomes. Data analysis was preceded by a normality test and a homogeneity test, followed by a t-test and an N-gain test.

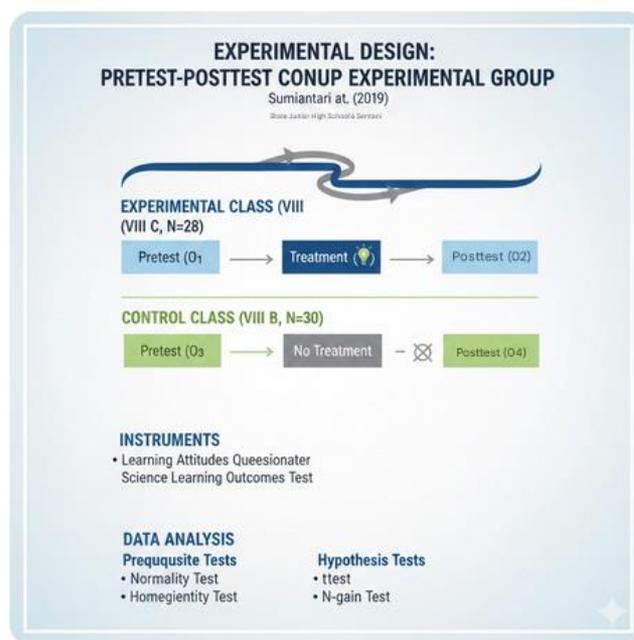


Figure 1. Method scheme

Result and Discussion

The data normality test used the One Sample Kolmogorov-Smirnov Test with SPSS version 27.00 in Table 1.

Table 1. Results of the Pretest Data Normality Test

Class	2-tailed Sig Value	Description
Experiment	0.114	Normally Distributed
Control	0.113	Normally Distributed

The results of the normality test indicate that the pretest data for the KE and KK learning outcomes are normally distributed with a significance level greater than 0.05. The homogeneity test for the pretest data for the learning outcomes aspect using the Levene Statistic conducted with SPSS version 27.00 is presented in Table 2.

The homogeneity test results showed that the pretest data between the Experimental and Control Classes obtained a significance value of 0.32, as this value is greater than the p-value threshold (p-value >

0.05), indicating that the data distribution has the same variance (homogeneous) in both the Experimental and Control Classes. The results of the posttest normality test for KE, KK, and attitude data at SMPN 6 Sentani used the One-Sample Kolmogorov-Smirnov Test conducted using SPSS version 27.00. The research hypothesis, Ho,

is accepted if the data are normally distributed, provided that Sig (2-tailed) $\geq (1/2 \alpha = 0.02)$, and conversely, Ho is rejected if the data are not normally distributed, provided that Sig (2-tailed) $< (1/2 \alpha = 0.02)$. The results of the posttest normality test for the Experimental and Control Classes are summarized in Table 3.

Table 2. Results of the Pretest Data Homogeneity Test

Resource	Levene Statistic	df1	df2	Sig.	
Pretest KE and KK	Based on Mean	1.01	1	53	.320
	Based on Median	1.01	1	53	.318
	Based on Median and with adjusted df	1.01	1	52.59	.318
	Based on trimmed mean	1.15	1	53	.288

Table 3. Results of the Posttest Normality Test for Attitude and Learning Outcomes Aspects

Class	Knowledge			
	Statistics	Sig 2-tailed	Statistics	Sig 2-tailed
Experiment	0.94	0.19	0.94	0.12
Control	0.93	0.13	0.93	0.10

The results of the posttest data normality test for the learning outcomes and attitudes aspects in the Experimental and Control Classes were all normally distributed at a significance level greater than 0.05. The results of the posttest data homogeneity test for the knowledge and attitudes aspects between the experimental and control classes were conducted using

Levene's Statistics with SPSS version 27.00. The research hypothesis, Ho, is accepted if the data have the same variance (homogeneous), provided that Sig ($\alpha \geq 0.05$), and Ho is rejected if the data have unequal variance (non-homogeneous), provided that Sig ($\alpha < 0.05$). The results of the homogeneity test analysis are presented briefly in Table 4.

Table 4. Results of the Posttest Data Homogeneity Test for Attitudes and Learning Outcomes Aspects

Resource	Levene Statistic	df1	df2	Sig.	
KE and KK Learning Outcomes Attitudes	Based on Mean	.001	1	53	.974
	Based on Median	.001	1	53	.973
	Based on Median and with adjusted df	.001	1	52.379	.973
	Based on trimmed mean	.004	1	53	.951
KE and KK Learning Outcomes	Based on Mean	.923	1	53	.341
	Based on Median	.707	1	53	.404
	Based on Median and with adjusted df	.707	1	48.803	.405
	Based on trimmed mean	.853	1	53	.360

The results of the homogeneity test for posttest data on attitudes and learning outcomes in the control and experimental classes at SMPN 6 Sentani indicate that the posttest data on attitudes in the experimental and control classes all have the same variance or are homogeneous with a significance level of $\alpha \geq 0.05$. Meanwhile, the posttest data on learning outcomes in the control and experimental classes all have the same variance or are homogeneous with a significance level of $\alpha \geq 0.05$. The difference test in this study was conducted on pretest and posttest data between two unpaired groups, namely the pretest data of the control and experimental classes. Based on the prerequisite tests for

normality and homogeneity of the pretest data, which met the assumptions, a parametric test was conducted using an independent sample t-test. The research hypothesis formulated is that Ho is accepted if there is no significant difference in pretest scores between the control and experimental classes, namely when the Asymp. Sig. (2-tailed) $\geq (1/2 \alpha = 0.02)$; otherwise, Ho is rejected if there is a significant difference in pretest scores between the control class and the experimental class using the Science Probalusan model in learning. The results of the pretest data difference test for the control and experimental classes are summarized in Table 5.

Table 5. Independent Sample T-Test Results for the KE and KK Pretests

Levene's Test for Equality of Variances	t-test for Equality of Means		95% Confidence Interval of the Diffence	
	Sig.	Sig. (2-tailed)	Mean Difference	Lower Upper

Equal Variances assumed	.874	.092	4.85	-0.819	10.52
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The results of the two-sample independent t-test on pretest scores indicated no significant difference between the control and experimental classes. This was demonstrated by a significance value of 0.092 ($p > 0.05$) assuming equal variances (Levene's Test: $p = 0.874$), with a mean difference of 4.853 and a 95% confidence interval

between -0.819 and 10.526. This suggests that both groups had relatively equal initial ability levels before the treatment. The results of the posttest data differences in the control and experimental classes are summarized in Table 6.

Table 6. Independent Sample T-Test Results for the KE and KK Posttests

Levene's Test for Equality of Variances		t-test for Equality of Means			95% Confidence Interval of the Difference	
Equal Variances assumed	Sig.	t	Sig. (2-tailed)	Mean Difference	Lower	Upper
KE and KK knowledge	.905	14.79	<.001	40.10	34.66	45.53
KE and kk's attitude	.285	2.22	.030	4.15	.412	7.89

The results of a two-sample independent t-test on posttest scores indicated a significant difference between the experimental and control classes. Based on the assumption of equal variance (Levene's Test: $p = 0.90$), a significance value of <.001 ($p < 0.05$) was obtained, with a t-value of 14.79 and a mean difference of 40.100. The 95% confidence interval ranged from 34.66 to 45.53, which does not include the value of zero. This study indicates that the treatment given to the experimental class, namely the use of the Science Probalusan model in learning, had a positive impact on improving student learning outcomes compared to the control class (without the use of the Science Probalusan model). Based on the results of the t-test for attitudes toward KE and KK, a sig. (2-tailed) value of 0.030 (assuming homogeneous variance) was obtained, which is below the significance limit of 0.05. This indicates a significant difference between the student attitude questionnaires in the experimental and control classes. The average attitude questionnaire score in the experimental class was higher, with a mean difference of 4.15, and a confidence interval that did not include zero. Therefore, the treatment (the use of the Science Probalusan model in learning) was proven to have a positive influence on student attitudes. The results of the N-Gain test for the control and experimental classes are summarized in Table 7.

Table 7. Results of the N-Gain Analysis of KE and KK

	Average N-Gain	Category
Experimental Class	65.24	Medium
Control Class	7.74	Low

Based on the results of the N-Gain analysis, an average increase in learning outcomes was obtained of 65.24% in the experimental class and 7.74% in the control class. Referring to (Dalila et al., 2022; Tong et al., 2022), the N-Gain value of the experimental class is in the medium category, while the control class is included in the low category. This difference in categories indicates

that the treatment given to the experimental class was able to produce a more effective increase in understanding compared to learning in the control class without using the Probalusan model. This study proves that the practice-based Probalusan model used in the experimental class has a real contribution to improving student learning outcomes.

Discussion

The percentage diagram of KE and KK attitudes in Figure 2 shows a significant difference between the experimental and control classes. The experimental class had an attitude percentage of 80%, while the control class was around 75.80%. These data indicate that the use of the Science Probalusan model in the experimental class had a positive impact on improving attitudes compared to the control class.

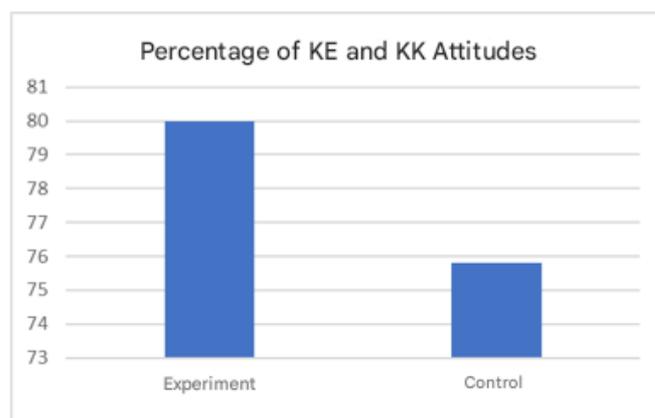


Figure 2. Percentage of KE and KK attitudes

This difference in percentage values can be used as a basis for assessing the effect of the Science Probalusan model on learning in the experimental class. The higher percentage in the experimental class indicates that the Science Probalancing model implemented in the experimental class was able to build better attitudes in students compared to learning without the Science Probalancing model in the control class. These results

support research conducted by Widyantoro et al. (2025), Almulla (2020) which showed that the implementation of the Science Probalusan model creates active, innovative, and enjoyable learning, thus helping to build positive attitudes in students in learning science. Overall, the results in this diagram demonstrate the success of the Science Probalusan model implemented in the experimental class in improving student attitudes, while also emphasizing the importance of using innovative learning models that are appropriate for the learning process to achieve optimal results.

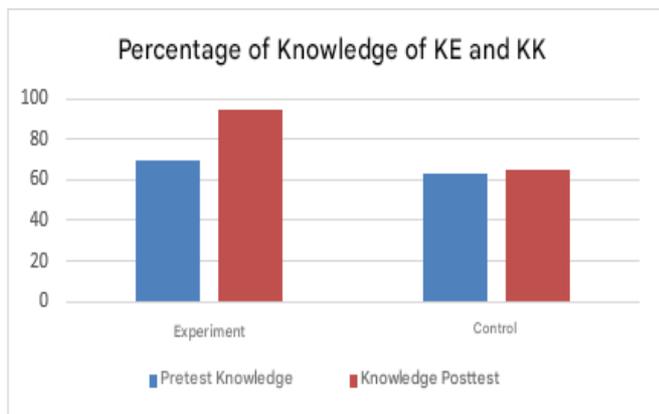


Figure 3. Percentage of knowledge of KE and KK

Based on Figure 3, the percentage of knowledge in the experimental and control classes based on the pretest and posttest results shows a striking difference between the two classes. In the experimental class, the pretest knowledge score was around 69.90%, while after the treatment, the posttest score significantly increased to 94.60%. Conversely, the control class experienced an increase from 62.70% in the pretest to around 65.10% in the posttest. This study shows that the use of the Science Probalusan model in the experimental class significantly improved student knowledge, as reflected in the substantial increase in the posttest percentage. Meanwhile, the control class, which did not receive the Science Probalusan model, experienced only a slight improvement in knowledge after the learning process. These test results align with research by Salim et al. (2024) and Rahman et al. (2024) on the development of the Science Probalusan model, which found that the application of the Science Probalusan learning model significantly improved student knowledge. This improvement was indicated by an increase in student learning outcomes on the posttest. In contrast, the group that did not receive this model showed nearly stagnant learning outcomes, with only a 2.40% increase, from 62.70% to 65.10%.

Therefore, it can be concluded that the implementation of the Probalusan Science model in classroom learning can effectively improve student

learning outcomes. This aligns with Susilawati et al. (2024), Hindun et al. (2024), Sumanti et al. (2023) research, which found that the Probalusan Model is effective in improving students' knowledge and science process skills. In general, Figure 2 confirms the research findings that the learning implemented in the experimental class was more effective in improving student knowledge compared to the control class. This can provide an important basis for educational policymakers in selecting more effective learning strategies to improve the quality of student knowledge. Figure 2 shows the learning outcomes of KE and KK in the pretest and posttest, showing significant differences between the experimental and control classes. In the pretest, the knowledge percentages of both classes were relatively similar, at 62.70% and 69.90%. However, after the use of the Science Probabilities model was given to the experimental class, there was a very significant increase based on the pretest results of 69.90% to 94.60% based on the posttest results, while the control class experienced a slight increase in knowledge based on the pretest results of 62.70% to 65.10% based on the posttest results.

The significant improvement in the experimental class reflects the influence of the Science Probalancing model applied to improve student understanding. These data indicate that the Science Probalancing model used in the experimental class proved more optimal in promoting improved learning outcomes compared to the control class without the Science Probalancing model. The use of the Science Probalancing model in learning can contribute significantly to student learning outcomes. From a constructivist perspective, learning emphasizes the active role of students in constructing knowledge through experience and social interaction (Do et al., 2023; Wiyono et al., 2025). Vygotsky emphasized the importance of social and environmental interactions as the primary medium for reconstructing new knowledge. This approach encourages students to become active learners who develop their own concepts and understanding with the guidance of the teacher as a facilitator (Singh et al., 2022).

This research also aligns with research by Salim et al. (2024), Koçoğlu et al. (2025), Ariyani et al. (2025) which stated that the problem-based learning (PBL) model significantly improved student learning outcomes at SMP Negeri 36 Kerinci. The analysis showed that posttest scores in the experimental class implementing PBL were higher than those in the control class. Overall, the analysis results based on Figure 2 emphasize the importance of selecting innovative and in-depth learning models to support improved student learning outcomes. This research also provides recommendations to teachers to use innovative learning

models such as the Science Probalusan model, so that the quality of learning can continue to be improved.

Based on Figure 3, the percentage of attitudes and learning outcomes for the experimental and control classes in the pretest and posttest shows that the distribution of results is quite different between the two classes. In terms of attitudes, the percentages for the experimental and control classes were nearly equal, ranging from 80.0% and 75.80%, respectively. This indicates that student attitudes in both classes were comparable before the treatment. In the pretest, both the experimental and control classes also showed similar scores, between 62.70% and 69.90%. This means that before the treatment, the learning outcomes of students in both classes were nearly identical, with no significant differences. However, after the treatment, there was a significant change in the posttest learning outcomes. The experimental class achieved a learning outcome of 94.60%, while the control class achieved only 65.10%. The results in Figure 3 indicate that the use of the Probalusan IPA model in the experimental class had a significant effect on improving student learning outcomes. The significant difference in posttest results between the experimental and control classes provides empirical evidence of the influence of the Probalusan IPA model in learning (Serdyukov, 2017; Sari et al., 2024). These data strengthen the argument for the importance of selecting the right innovative learning model in learning to optimally improve student learning outcomes.

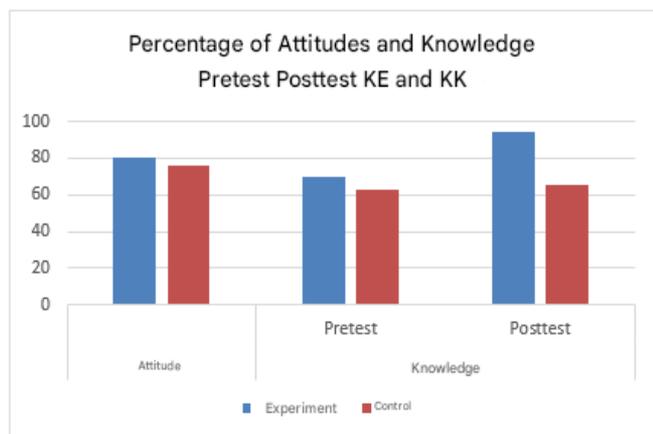


Figure 4. Percentage of attitudes and knowledge, pretest, posttest, and core competency

Figure 4 shows the percentage of attitudes and learning outcomes in the pretest and posttest of the experimental and control classes, indicating a significant difference between the two classes in terms of learning outcomes after being given the treatment. This difference indicates that the use of the Probalusan IPA model in the experimental class had a very positive impact on improving student learning outcomes.

Overall, Figure 3 illustrates the influence of the Probalusan IPA model on learning, both in terms of attitudes and student learning outcomes. This study reinforces the importance of selecting the right innovative learning strategy or model to optimally achieve learning objectives (Hattie & Donoghue, 2016; Suryawati & Osman, 2017).

Conclusion

The results of the study showed that: the application of the Probalusan IPA model in the experimental class significantly increased students' positive attitudes compared to the control class; the Probalusan IPA model was proven to be effective in improving student learning outcomes, as indicated by the increase in the percentage of posttest results in the experimental class reaching 94.60%, while the control class was only 65.10%; before the treatment, students' attitudes and learning outcomes in both classes were relatively balanced, indicating that the improvement in the experimental class was truly influenced by the Probalusan learning model used; the Probalusan IPA model supports active and innovative learning that is in accordance with the principles of constructivism, encouraging students to become more independent learners and understand concepts in depth; and these results demonstrate the importance of using innovative and contextual learning models to achieve optimal learning outcomes in science learning.

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Author Contributions

Conceptualization; methodology.; validation; formal analysis; investigation; resources; data curation; writing – original draft preparation; writing – review and editing.; visualization: R. E. R. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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