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The Influence of Learning Models and Formative Tests on Students Science Learning Outcomes

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Abstract: Science learning requires learning that is not only centered on the teacher (teacher centered), but must also be centered on students (student centered) (Zulfikar: 2021). This study is a type of true experimental research that aims to determine the effect of learning models and formative tests on the science learning outcomes of students of class VIII of SMPN 3 Majene. The independent variables in this research are the probing prompting and problem-based learning models. The moderator variables are objective and subjective formative tests, while the dependent variable is the learning outcome. The population is all students in class VIII of SMPN 3 Majene at the eight classes. The sample for this research consisted of four classes. The four sample classes are experimental classes with 120 students. Data collection was carried out using science learning outcomes tests. The collected data was analyzed using descriptive and inferential analyses, especially two-way ANOVA analyses. The results of inferential analysis on the hypothesis show that there is influence between the learning model and formative tests on students science learning outcomes.

Keywords: Formative Tests; Probing Prompting; Problem-Based Learning; Science Learning Outcomes.

Introduction

Learning outcomes are all measurement activities (data and information collection), processing, interpretation and consideration (Hamalik, 2019) Students who have low ability in solving physics problems tend to recognize problems based on the presentation of the problem (surface features), do not carry out evaluations, and tend to use formulas in solving problems (Lin & Singh, 2013). Science learning requires learning that is not only centered on the teacher (teacher centered), but must also be centered on students (student centered) (Zulfikar, 2021). So, choosing the right learning model is very important to support the effective implementation of science learning in the classroom. Apart from that, the right learning model can support and enhance the learning process. One learning model that can be used is the Probing Prompting learning model. According to Suherman (Huda, 2015)Probing means digging or tracking, and Prompting means directing or guiding.

This model involves the use of questions designed to stimulate students' critical thinking and in-depth understanding of the material being studied. Through this model, students are invited to think further about the concepts being studied so that they can increase their understanding and ability to apply these concepts in various situations. This model also acts as a controller for students during learning. Probing prompting is a model in learning (Shoimin, 2020). This model is used by teachers to explore students' understanding by asking challenging questions and triggering students to think more deeply. This model aims to encourage students to express broader knowledge, improve understanding, and find answers independently through a series of structured questions. Furthermore, Novena and Kriswandani (2018) stated that one of the learning models that is in accordance with the science learning content standards is the probing prompting learning model. Diasputr (2013) says that the involvement or participation of students in the teaching and learning process, so that direct communication can be created

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both between students and teachers and between students, students' concentration in following the lesson can be maintained until the end of the lesson is an advantage of the probing prompting learning model. The results of the study by Theriana stated that there was an influence of the probing prompting learning model on student learning outcomes (Theriana, 2020). Ana explained that learning using the probing prompting learning model can improve student learning outcomes in class X of SMA Nurul Amal Palembang. Rostiana (2022) also stated that the application of the probing prompting model can improve students' understanding of physics learning concepts with increasing percentage values, from before the test and after the test (Rostiana & Nana, 2022).

It is not only the choice of learning model that must be considered to obtain the desired teaching and learning process; instruments are also needed to carry out evaluations and improvements during learning. This is necessary because students' learning abilities vary. Through this instrument, teachers will have a basis for seeing to what extent the learning process can reach students. The test function can be viewed from 3 things, including the function for the class, the function for guidance, and the function for administration (Arikunto, 2013).

The instrument in question can use assessments in the form of formative tests. In the Independent Curriculum, the priority assessment is formative tests, which are oriented towards the development of students' competencies. Formative tests can be used to measure the extent to which students have understood the material being taught and to provide constructive feedback for students and teachers. With formative tests, teachers can identify learning difficulties experienced by students and immediately take corrective action to improve overall student learning outcomes. With their role as assessment and feedback on the learning process, formative tests make it possible to become a basic tool for improving the teaching and learning process in the classroom.

Based on the results of initial observations in all class VIII of SMPN 3 Majene on May 6th – 11th, 2024. There were several problems related to science lessons, including the delivery of material by the teacher too quickly and learning was still dominated by the teacher so that it was less understandable, especially for students whose level of understanding was not fast enough. As a result, students' science learning outcomes are not optimal. Researchers also conducted direct interviews with science teachers. According to his statement, of the 252 class VIII students, less than 10 students got a fairly high score, namely 95, in science lessons in the Even Semester of the 2023/2024 Academic Year. The rest are in medium to low vulnerability. This was also proven during classroom observations, researchers conducted short interviews with students regarding science material. As a result, most students were unable to answer well. For this reason, efforts are needed to improve student learning outcomes. During the observation, the researcher observed the learning model carried out by the teacher. The learning steps carried out by the teacher in class are: (1) conducting an introduction. (2) Explain the material and problem orientation. (3) students are given guidance in the form of a textbook. (4) giving assignments and group discussions. (5) presenting the results of the discussion, and (6) evaluation. From the observed learning steps, it is known that there are steps from a problem-based learning model. However, in its implementation, most students are not active when giving assignments or group discussions. So, learning in class is not optimal (Nurmahasih & Jumadi, 2023). Problem Based Learning is a learning model based on problems faced by students related to the basic competencies being studied by students. The problems in question are real or something that becomes difficult questions for students (Kosasih, 2014:88). According to Ngalimun (2016) problem based learning is one of the innovative learning models that can provide active learning conditions for students. According to Kurniasih (2015), the main objective of problem-based learning is to explore students' creative thinking skills and motivate students to continue learning. There are 5 (five) syntaxes of problem-based learning models, namely student orientation, organizing students to learn, guiding individual or group experiences, developing and presenting work results and evaluation (Yulianti, 2019)

Feedback from teachers and learners plays an important role in formative assessment practices because of its significant support for student learning (Black & William, 2009), self-regulated learning (Zimmerman & Bandura, 1994) and peer-assisted learning. Student involvement in self-assessment and peer assessment for effective formative assessment strategies enhances self-regulated learning skills (Zimmerman and Bandura 1994).Therefore, different types of feedback provide different formative assessment interventions (Hattie & Timperley, 2007).

Meanwhile, for the use of formative tests in the research results by Ali M.S, Khaeruddin & Palloan (2021) explained that the use of formative tests has an effect on the mastery of research methodology material. Other research results by Purwanto (2013) stated that formative tests using certain test forms provide benefits for students with certain thinking abilities.

Therefore, based on the description above, the researcher wants to know more about the science

learning outcomes of students applying the probing prompting learning model and the learning models that have been applied previously, namely the problem-based learning model and formative tests by conducting research with the title "The Influence of Learning Models and Formative Tests on the Science Learning Outcomes of students at Class VIII of SMPN 3 Majene".

Method

This study is a type of true experimental research (experimental method) with independent variables, namely a learning model with a probing prompting level and a learning model with a problem-based level. The moderator variable is a formative test with an objective test level and a subjective test level, and the dependent variable is science learning outcomes. The research design used was a 2 x 2 factorial design. The analysis technique used was descriptive analysis and two-way ANOVA inferential analysis. In this research, there are three variables, namely the independent variable, the learning model (probing, prompting, and problem-based), the moderator variable, the formative test (objective and subjective), and the dependent variable, namely science learning outcomes. The formula used in the descriptive statistical analysis for this study is Siregar (2014).

Table 1. Research Factorial Design Matrix

Tes formatif	Model pembelajaran		
	Probing prompting (A_1)	Berbasis masalah (A_2)	Jumlah
Tes obyektif (B_1)	$A_1 B_1$	$A_2 B_1$	$A_1 B_1 + A_2 B_1$
Tes subyektif (B_2)	$A_1 B_2$	$A_2 B_2$	$A_1 B_2 + A_2 B_2$
Jumlah	$A_1B_1 + A_1 B_2$	$A_2B_1 + A_2 B_2$	$A_1 B_1 + A_2 B_1 + A_1 B_2 + A_2 B_2$

The population in this study was all students in class VIII of SMPN 3 Majene spread across eight classes. The sample in this study used four classes using a simple random draw technique. Based on this technique, it was obtained that (1) Jupiter Class was given a probing prompting learning model and objective formative tests. (2) Saturn Class was given a probing prompting learning model with subjective formative tests. (3) Neptunus Class was given a problem-based learning model and objective formative tests. (4) Mars Class was given a problem-based learning model and subjective formative tests.

The measuring instrument used is a science learning outcomes test instrument. The instrument has gone through a validation process, both theoretically and empirically. The results of the assessment by experts were analyzed using the Aiken formula proposed by Retnawati (2016), to obtain a valid and reliable instrument consisting of 32 learning outcomes test items.

The data analysis techniques used in this research are descriptive analysis and inferential analysis. Hypothesis testing uses two-way ANOVA analysis, then continues with further testing using the t-test. After that, a Tukey test analysis was carried out manually. Before testing the hypothesis, the analysis prerequisite tests are first carried out, namely the normality test and homogeneity test. Researchers used the Liliefors normality test with the equation proposed by Riadi (2016)

The normality test uses the Liliefors test at a significance level of 0.05. Based on the calculation results of the normality test of the variance of science learning outcomes, the value L_{count} = 0.073998, while L_{table} was obtained at 0.080913. Then we get $L_{count} < L_{table.}$ These results explain that the learning outcomes data from the four classes come from a normally distributed population.

Test homogeneity using the Bartlett test. Based on the calculation results of the normality test of variance in science learning outcomes, it was obtained that X^2_{count} = 1.317061, while X^2_{table} = 7.814728. So, we get $X^2_{count} < X^2_{table}$ at a value of α = 0.05. These results explain that the science learning outcomes data comes from a population that has a homogeneous variance.

In this study, hypothesis testing is used so that the research hypothesis is answered in this research, namely using the two-way ANOVA Test with a 2 x 2 factorial design. Then, proceed with the t-test to find out which learning model is higher. If there are differences between the four groups (cells), then they can be tested further using the Tukey test.

Result and Discussion

The results of the descriptive analysis of each experimental class obtained will be described as follows:

Description of Science Learning Results for Experiment Class 1 Students Probing Prompting Learning Model and Objective Formative Tests

This variable was measured using a learning outcomes test in the form of multiple-choice questions totaling 32 items and distributed to the experimental class 1 sample, namely Jupiter Class with 30 students.

Table 2. Frequency Distribution of Science Learning Outcome Scores for Experimental Class 1

Interval	Category	Frequensy	Percentage
0-5	Very low	0	0.00
6-12	Low	1	3.33
13-19	Medium	4	13.33
20-26	High	13	43.33
27-33	Very high	12	40.00
Amount		30	100

Table 2 shows that there are no students who are at very low levels. There is 1 student in the low category with a percentage gain of 3.33%, there are 4 students in the medium category with a percentage gain of 13.33%, there are 13 students in the high category with a percentage gain of 43.33%, and there are 12 students in the very high category with a percentage gain of 40%. Based on the average science learning result score obtained by students at Jupiter Class, it is 23.63, which means that the average science learning result score obtained by students is in the score range of 20-26. This indicates that the science learning results of students at Jupiter Class are in the high category. It can be concluded that the science learning outcomes of students who are taught using the probing prompting learning model and given objective formative tests can be said to be very good.

Description of Science Learning Results for Experiment Class 2 Students Probing Prompting Learning Model and Subjective Formative Tests

This variable was measured using a learning outcomes test of multiple-choice questions totaling 32 items and distributed to the experimental class 1 sample, namely Saturnus Class with 30 students.

Table 3. Frequency Distribution of Science Learning Outcome Scores for Experimental Class 2

Interval	Category	Frequensy	Percentage (%)
0-5	Very low	0	0.00
6-12	Low	1	3.33
13-19	Medium	13	43.33
20-26	High	13	43.33
27-33	Very high	3	10.00
Amount		30	100

Table 3 shows that there are no students in the very low category. There is 1 student in the low category with a percentage of 3.33%. There are 13 students in the medium category with a percentage gain of 43.33%, there are 13 students in the high category with a percentage gain of 43.33%, and there are 3 students in the very high category with a percentage gain of 10%. Based on the average science learning result score obtained by students at Saturnus Class, it is 20.3, which means that the average science learning result score obtained by students is in the score range of 20-26. This indicates that the science learning results of Saturnus Class are in the high category. It can be concluded that the science learning outcomes of students who are taught using the probing prompting learning model and given subjective formative tests can be said to be very good.

Description of Science Learning Results for Experimental Class 3 Students Problem-Based Learning Model and Objective Formative Tests

This variable was measured using a learning outcomes test of multiple-choice questions totaling 32 items and distributed to the experimental class 1 sample, namely Neptunus Class, with 30 students.

Table 4. Frequency Distribution of Science Learning Outcome Scores for Experimental Class 3

Interval	Category	Frequensy	Percentage (%)
0-5	Very low	0	0
6-12	Low	12	40
13-19	Medium	13	43
20-26	High	5	17
27-33	Very high	0	0
Amount		30	100

Table 4 shows that there are no students in the very low category. There are 12 students in the low category, with a percentage of 40%. There are 13 students in the medium category with a percentage gain of 43%, there are 5 students in the high category with a percentage gain of 17%, and there are no students in the very high category. The average science learning outcome score obtained by students at Neptunus Class is 14.83, which means that the average science learning outcome score of students is in the score range of 13-19. This indicates that the science learning results of class VIII Neptunus SMPN 3 Majene students are in the medium category. It can be concluded that the science learning outcomes of students who are taught using a problem-based learning model and given objective formative tests can be said to be good.

Description of Science Learning Results for Experimental Class 4 Students Problem-Based Learning Model and Subjective Formative Tests

This variable was measured using a learning outcomes test in the multiple-choice questions totaling 32 items and distributed to the experimental class 1 sample, namely Mars Class with 30 students.

Table 5. Frequency Distribution of Science Learning Outcome Scores for Experimental Class 4

Interval	Category	Frequensy	Percentage (%)
0-5	Very low	0	0
6-12	Low	2	7
13-19	Medium	10	33
20-26	High	10	33
27-33	Very high	8	27
Amount		30	100

Table 5 shows that there are no students in the very low category. There are 2 students in the low category with a percentage gain of 7%, there are 10 students in the medium category with a percentage gain of 33%, there are 13 students in the high category with a percentage gain of 33%, and there are 8 students in the very high category with a percentage gain of 27%. Based on the average science learning result score obtained by students at Mars Class, it is 21.66, which means that the average science learning result score obtained by students is in the score range of 20-26. This indicates that the science learning results at Mars Class are in the high category. It can be concluded that the science learning outcomes of students who are taught using a problem-based learning model and given subjective formative tests can be said to be very good.

The Results of hypothesis testing with two-way ANOVA Analysis will be described as follows:

Based on the results of the analysis that has been carried out, the science learning outcomes of students who study using the probing prompting learning model and the problem-based learning model. This was carried out on all class VIII students of SMPN 3 Majene through a summary of two-way variance analysis as shown in table 6, complete data can be seen in the attachment.

Table 6. Summary of two-way ANOVA analysis Calculation Results

Sumber varians	JK	db	RJK	F_{hitung}	F_{tabel} $\alpha = 0{,}05$
Antar A	414.41	1	414.41	16.90	3.92
Antar B	91.88	1	91.88	3.75	3.92
Interaksi A x B	783.69	1	783.69	31.96	3.92
Dalam sel	2.844.1	116	24.52	-	-
Total	4134.08	119	-	-	-

Based on table 6 from the results of the two-way ANOVA analysis, the following data was obtained*:*

Overall, the science learning outcomes of students taught using the probing prompting learning model are higher than those of students taught using the problem-based learning model.

Based on table 6 Regarding the summary of the calculation results of the two ways ANOVA analysis, for learning in the column obtained $F_{count} = 16.90$, while the F_{table} value for the degree of freedom df = 1 is 3.92. So, we get $F_{count} = 16.90 > 3.92 = F_{table}$, then H_0 is rejected, and H_1 is accepted. This means that overall, the science learning outcomes of students who are taught using the probing prompting learning model are higher than those who are taught using the problem-based learning model.

To obtain stronger analysis results for testing hypothesis 1 on the mine effect, researchers also conducted a Tukey test between groups (A1 and A2). The results of the analysis obtained $Q_{count} = 5.80 > Q_{table}$ 3.68, so H_0 was rejected and H_1 was accepted, meaning that the science learning outcomes of students who were taught using the probing prompting learning model were higher than those of participants who were taught using the problem-based learning model. The conclusion from the Tukey test results is the same as the results obtained from the F-test. Students who are taught using the probing prompting learning model get higher science learning outcomes scores compared to students who are taught using the problem-based learning model. The conclusion from the Tukey test results is the same as the results obtained from the F-test. Students who are taught using the probing prompting learning model get higher science learning outcomes scores compared to students who are taught using the problem-based learning model.

The results of Nadeak et al.'s (2023) research stated that there were differences in student learning outcomes taught using the probing prompting learning model and the conventional model. The results of the data analysis obtained an average of 82 for the experimental class, and an average of 76.3 for the control class. This means that the average of students in the experimental class is higher than the average of students in the control class. For the test of the difference between the two means, the t count was 1.94. So it can be concluded that the average of the two samples is significantly different. Furthermore, the results of the study by Mendrofa et al (2024)showed that there were differences in the learning outcomes of students who were given the probing prompting learning model and the learning outcomes of students who were given the direct learning model. The learning outcomes of students who were given the probing prompting learning model were higher than the learning outcomes of students who were given the direct learning model. This shows that there is an influence of

the use of the probing prompting model on student learning outcomes. Another opinion that supports the results of this study is a study conducted by Zuriyati (2022) providing a learning model using the probing prompting model has a very significant effect on the results of student learning activities in the basic competencies of the motor system in class XI MIPA 2 SMAN 1 Tanjung Raja. The results of the t-test analysis obtained were the Asymp. Sig (2-tailed) value of 0.00, where the probability value is below 0.05 so that H0 is rejected while Ha is accepted, this can prove that the use of a learning model with probing prompting has a significant effect on the results of student learning activities in Class XI IPA 2 SMAN 1 Tanjung Raja on Basic Competencies of the Motor System.

From the description of the research results above, it strengthens the assumption that providing the right treatment (learning) can affect the measured variables (learning outcomes). Based on the research results, it can be concluded that learning with the probing prompting model provides a better influence compared to the problem-based learning model.

Overall, science learning outcomes for students who were given objective formative tests were lower than for students who were given subjective formative tests

Based on table 6 Regarding the summary of the calculation results of the two ways ANOVA analysis, for the formative test in the column, F_{count} = 3.75, while the Ftable value for the degree of freedom df = 1 is 3.92. Thus, we get F_{count} = 3.75 < 3.92 = F_{table}, so H_0 is accepted and H_1 is rejected, meaning that overall, science learning outcomes for students who are given objective formative tests are lower than for students who are given subjective formative tests.

To obtain stronger analysis results for testing hypothesis 2 on the mine effect, researchers also conducted a Tukey test between groups (B1 and B2). The results of the analysis obtained Qcount = 2.72 < Q_{table} 3.68, so H_0 was accepted and H_1 was rejected, meaning that the science learning outcomes for students who were given objective formative tests were lower than for students who were given subjective formative tests. The conclusion from the Tukey test results is the same as the results obtained from the F-test. Science learning outcomes for students who were given objective formative tests were lower than for students who were given subjective formative tests.

Several research results that explain that the learning outcomes given objective formative tests are lower than the learning outcomes of students given subjective formative tests include: (1) Purwanto (2013)stated that the learning outcomes of the Educational Evaluation course for students who received essay formative tests were higher than those who received objective formative tests. (2) Magdalena et al (2023) stated that objective tests and subjective tests both have uses if they are right in choosing questions, but in objective tests there are answers that are not supported by knowledge because there are students who do not concentrate in the daily learning process, so that in objective tests students can choose answers with guessing techniques. Meanwhile, this subjective test can train students' mindsets, can develop the knowledge they have, can train children to put words into correct sentences and can help children to improve their learning outcome assessments.

From the description of the results above, it strengthens that giving subjective formative tests is more effective than giving objective formative tests to improve learning outcomes. Based on the results of the study, it can be concluded that the science learning outcomes for students who were given objective formative tests were lower than those for students who were given subjective formative tests.

There is an interaction between the learning model and formative tests on students' science learning outcomes

Based on table 6 Regarding the summary of the calculation results of the two ways ANOVA analysis, in the interaction column, F_{count}= 31.96. This value was then consulted with F_{table} for a significance level of α = 0.05, obtaining F_{table} = 3.92. Because F_{count}= 31.96 > 3.92 = $F_{table,}$ then H_0 is rejected, and H_1 is accepted. This indicates that there is an interaction between the learning model and formative tests on students' science learning outcomes. This means that students who are taught using learning models (probing, prompting, and problem-based) have interactions with students who are given formative tests (objective and subjective).

The results of this study are in line with Sucipta's research (2023) which states that there is an influence of interaction between learning models and forms of formative assessments that also have an impact on students' critical thinking skills. Another study by Rapi (2024) stated that the influence of interaction between learning models and forms of formative tests on science learning outcomes.

Because from the overall comparison test that was carried out, the results showed that there was an interaction effect, a further test was carried out using the t-test to find out which learning model was superior. Test criteria: if - t_{table} < t_{count} < + t_{table}; then accept H_0. For other prices, reject H_0. The t-test results were obtained for α = 0.05 and dk = 120 – 2 = 118, obtained t_{table} = 1.66. Because t_{count} = 8.65 > t_{table} 1.66, then Ho is rejected, and H1 is accepted. So, there is a difference in providing

learning models or probing prompting learning models that are higher than problem-based learning models.

Because there were differences in the further test (t-test), it was continued with the Tukey test. The Tukey test was carried out to look for significant differences between the four groups (cells) or the simple effect hypothesis. The number of samples in group research is the same size. The results of the Tukey test analysis can be seen in Table 6 as follows:

Tabel 7. Tukey Test Analysis Results

Sample Group	Q_{hitung}	Q_{tabel}
A_1B_1 dan A_2B_1	13.73	3.68
A_1B_2 dan A_2B_2	2.14	3.68
A_1B_1 dan A_1B_2	5.20	3.68
A_2B_1 dan A_2B_2	10.67	3.68

Based on the results of the Tukey test analysis, it can be concluded:

For students who were given objective formative tests, science learning outcomes for students taught using the probing prompting learning model were higher than for students taught using the problem-based learning model.

Based on table 7 related to the results of the Tukey test analysis, in the first row, namely A_1B_1 dan A_2B_1, in the column we get Q_{count} = 13.73. This value is then consulted with the Q_{table} value, for a significance level of α = 0.05, the Q_{table} value = 3.68. Because Q_{count} = 13.73 > Q_{table}= 3.68, then Ho is rejected and H1 is accepted, meaning that for students who were given objective formative tests, the science learning outcomes for students who were taught using the probing prompting learning model were higher than for students who were taught using the problem-based learning model. Students who were taught using the probing prompting learning model were higher than students who were taught using the problem-based learning model. So, it can be concluded that the probing prompting learning model is very good for students who are given objective formative tests.

This shows that, for students who were given objective formative tests and taught using the probing prompting learning model, the learning outcomes were higher than the learning outcomes of students taught using the problem-based learning model. Providing objective formative tests and probing prompting learning models is an excellent combination for improving students' science learning outcomes.

For students who were given subjective formative tests, science learning outcomes for students taught using the probing prompting learning model were lower than for students taught using the problem-based learning model.

Based on table 6 related to the results of the Tukey test analysis, in the first row, namely A_1B_2 dan A_2B_2, in the column we get Q_{count} = 2.14. This value is then consulted with the Q_{table} value, for a significance level of α = 0.05, the Q_{table} value = 3.68. Because Q_{count} = 2.14 < Q_{table} 3.68, then Ho is accepted and H1 is rejected, meaning that for students who were given a subjective formative test, the science learning outcomes for students who were taught using the probing prompting learning model were higher than for students who were taught using the problem-based learning model. However, the soundness of the accepted hypothesis (Ho) is different from the real data from the average score of student learning outcomes.

Based on the average score of learning outcomes for students who were given subjective formative tests, science learning outcomes for students taught using the probing prompting learning model were lower than for students taught using the problem-based learning model. When compared, the science learning outcomes for students taught using the probing prompting learning model received an average score of 20.3, and the science learning outcomes for students taught using the problem-based learning model received an average score of 21.67. This indicates that for students who were given subjective formative tests, the science learning outcomes for students who were taught using the probing prompting learning model were lower than for students who were taught using the problem-based learning model. Therefore, the provision that Q_{count} = 2.14 < Q_{table} 3.68 with the result H_o being accepted and H_1 being rejected could be ignored because it does not match the facts in the field. However, the research results remain in line with the research hypothesis.

Based on the explanation above, it can be concluded that science learning outcomes for students taught using the probing prompting learning model are lower than for students taught using the problem-based learning model. The low learning outcomes of students who are given the probing prompting learning model are caused by several factors. One of them is that the condition of most students is not suitable for implementing the probing prompting learning model. The probing prompting learning model focuses on stimulating thinking through gradual questions to explore students' understanding. However, in classes that received this treatment, students were less active in responding to questions, so the effectiveness of this model was reduced. Probing prompting is less effective when students are not used to the critical and analytical

thinking patterns needed to answer questions given by the teacher.

For students who are taught using the probing prompting learning model, science learning outcomes for students who are given objective formative tests are higher than students who are given subjective formative tests

Based on table 6 related to the results of the Tukey test analysis, in the first row, namely A_1B_1 dan A_1B_2, in the column we get Q_{count} = 5.20. This value is then consulted with the Q_{table} value, for a significance level of α = 0.05, the Q_{table} value = 3.68. Because Q_{count} = 5.20 > Q_{table} 3.68, then H_o is rejected and H_1 is accepted, meaning that for students who are taught using the probing prompting learning model, the science learning outcomes for students who are given objective formative tests are higher than for students who are given subjective formative tests. Students who were given a probing prompting learning model with objective formative tests obtained higher science learning outcomes compared to students who were given subjective formative tests.

Students who are given objective formative tests obtain higher learning outcomes than students who are given subjective formative tests. This is caused by several factors, one of which is the clarity of the structure and format of questions in objective formative tests, which are simpler, so that students more easily understand what is expected from the questions. Apart from that, objective formative tests allow students to answer more questions in a shorter time, in contrast to subjective formative tests, which require more time because they have to explain the answers in detail. Speed and accuracy in answering questions are also influential factors, where objective formative tests more directly measure understanding of concepts without requiring additional interpretation as in subjective formative tests.

Based on the explanation above, treatment by providing a probing prompting learning model with objective formative tests is very good for use in the science learning process in class VIII of SMPN 3 Majene.

For students who are taught using a problem-based learning model, science learning outcomes for students who are given objective formative tests are lower than for students who are given subjective formative tests.

Based on table 6 related to the results of the Tukey test analysis, in the first row, namely A_2B_1 dan A_2B_2, in the column we get Q_{count} = 10.67. This value is then consulted with the Q_{table} value, for a significance level of α = 0.05, the Q_{table} value = 3.68. Because Q_{count} = 10.67 > Q_{table} 3.68, then Ho is rejected and H1 is accepted, meaning that for students who are taught using a problem-based learning model, the science learning outcomes for students who are given objective formative tests are lower than for students who are given subjective formative tests. Students who were given a problem-based learning model with objective formative tests obtained lower science learning outcomes compared to students who were given subjective formative tests.

Problem-based learning is a learning model that emphasizes the active involvement of students in solving contextual problems to increase a deeper understanding of concepts. In science learning, students who are taught using this model tend to have better learning outcomes because they are involved in exploration, analysis, and problem-solving independently or collaboratively. When learning outcomes are measured using formative tests, differences in the type of test given can influence student achievement. Subjective formative tests, such as essays or descriptions, allow students to express their understanding more broadly and in depth, making it more appropriate to a problem-based approach that demands critical and analytical thinking skills. In contrast, objective formative tests, such as multiple choice, place more emphasis on recognizing and selecting the correct answer, which may be less able to depict complex thought processes. Therefore, students who are given subjective formative tests tend to obtain higher learning outcomes compared to students who are given objective formative tests because students are more trained in organizing and communicating their understanding of the material they have studied.

Based on the explanation above, treatment by providing a problem-based learning model with subjective formative tests is good for use in the science learning process in Class VIII of SMPN 3 Majene.

Conclusion

Based on the research results and discussions presented in the previous chapter, it can be concluded that there is an ifluence between the learning model and formative tests on students' science learning outcomes.

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