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The Correlation Of A Scientific Approach Using The Probing Prompting Technique And A Problem-Based Learning Model On Learning Outcomes On Reaction Rate Material

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Abstract—This study began with the learning results on the subject of the still-low reaction rate. The purpose of this study is to discover the relationship between the scientific method and learning outcomes in the reaction rate material by using the probing prompting technique and the issue based learning model alone or combination. Quantitative research using correlational methodologies and a one-shot case study design is the approach of choice. Class XI MIPA SMAN 1 Padang and XI MIPA SMAN 14 Padang were the subjects of this research. A total of 144 persons were selected for the study using a simple random sampling technique. Questionnaires and learning outcomes assessments in the form of 22 objective questions that had been verified for validity and reliability were used in this study. The results found a positive and significant correlation between: 1) the scientific approach to learning outcomes using the probing prompting technique, with a correlation coefficient of 0.903 suggesting a very strong correlation. This suggests that by using the probing prompting technique, the scientific approach module can improve learning results by 81.5 percent. 2) A scientific approach to learning outcomes using a problem-based learning model with a correlation coefficient of 0.770, suggesting a strong link. This suggests that the scientific approach module, when combined with a problem-based learning model, has an effective contribution of 59.3 percent in improving learning outcomes. 3) Using the probing prompting technique and the issue based learning model together on the reaction rate learning outcomes yielded a correlation coefficient of 0.958, indicating a very strong correlation. The contribution of the two independent variables to the dependent variable in this study is 91.8 percent, with the remainder impacted by other variables.

Keywords—Scientific Approach; Probing Prompting; Problem-Based Learning; Learning Outcomes; Reaction Rate

I. INTRODUCTION

One of the most important topics studied in chemistry classes is reaction rate. Students should be able to apply concepts and equations in particular calculations based on previously created learning objectives to improve learning outcomes in the reaction rate material. The meaning of learning outcomes is the results obtained from students' mastery of knowledge, attitudes, and abilities

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following the teaching and learning process, as evidenced by test scores. Learning outcomes were remained low in the response rate content, which was due to a number of factors, including students finding the reaction rate material difficult to understand.

According to the findings of the preliminary study, students continue to believe that the reaction rate material is challenging, as evidenced by the average UH score of SMAN 14 Padang students in the 2019-2020 school year, which is still below the KKM of 73.8. Students at SMAN 1 Padang, with an average UH score of 72.3, and SMAN 13 Padang, with an average UH score of 77.4, showed the similar pattern. Apart from the poor learning outcomes, students' feelings that the reaction rate content was difficult to understand contributed to a lack of class participation during the learning process.

Based on the issues raised above, students will require a proper method in order to boost their participation in the learning process and improve their learning results. The teaching and learning process should be approached scientifically, according to the 2013 curriculum. This procedure is followed to develop attitudes, knowledge, and abilities [1]. Organizing learning experiences, or the 5M learning process, which includes observing, asking, reasoning, associating, and sharing, is how the scientific approach is carried out. It is intended that by following these five processes, students will become more motivated and capable of critical thinking during the teaching and learning process. The purpose of employing a scientific approach is to improve students' critical thinking skills and to stimulate their curiosity [1]. This is what can inspire students to pay attention to everything around them.

Curiosity and trust in one's own talents are the two most powerful motivators for learning [2]. This statement supports the viewpoint [3] that students' curiosity can be stimulated by asking them. These questions are a way to get students thinking and learning [4]. To do so, a strategy in the teaching and learning process is required, namely the use of questions that encourage students to become more active and critical in their problem-solving. According to [3] there are two types of questions to ask during the teaching and learning process: probing questions and prompting questions. According to [5] the benefits of probing and prompting techniques in the teaching and learning process include motivating students to think more actively, assisting in the interpretation of previously unknown answers, providing opportunities to defend opinions, and providing experience with low and high level questions. Question prompting improves the quality of responses [6]. As a result, this probing prompting question can be used to improve critical thinking skills while also increasing participation in the learning process.

Problem-based learning (PBL) is a model for improving critical thinking abilities and learning outcomes. Problem-based learning (PBL) is based on constructivism, which is a cognitive psychology theory. According to constructivism philosophy, students learn by interacting with their surroundings [7]. Students learn by attempting to solve real-world problems (contextual) in a systematic manner utilising a problem-based learning model, which requires student participation in analyzing data in order to solve a problem [8].

The benefits of the problem-based learning model include: becoming accustomed to confronting and attempting to solve problems, actively participating in problem solving, requiring higher-order thinking skills, and becoming accustomed to using experimental methods [9]. Based on these benefits, students can learn utilising a problem-based learning model as an option to improve their critical thinking skills when confronted with and solving a problem.

II. Literatur Review

A. Scientific Approach

The scientific approach is a structured teaching and learning process that guides students through the stages of observing (problem identification), formulating problems, formulating hypotheses, collecting data using various techniques, analysing data, drawing conclusions, and communicating what they've learned [1]. The scientific approach tries to educate students how to recognise and analyse various materials using a scientific approach, while also recognising that information can come from anywhere, at any time, and does not have to come directly from the teacher.

The scientific approach consists of five stages: 1) the observation stage, in which students are exposed to the content to be addressed and collect facts in the form of objective data, which is then processed according to the student's developmental level. 2) The questioning stage is used to improve students' ability to formulate questions, as well as their creativity and curiosity [1]. 3) Reasoning is the process of thinking logically about a fact and observing it in order to arrive at a knowledge conclusion [10]. In addition, it is possible to answer the questions posed by making observations in the field and reading other available sources [11]. 4) Associating entails students participating in the program to determine the relationship between information and the shape of that

relationship. 5) Communicating is the final phase in the scientific learning process. At this stage, the actions include communicating the findings of observations and conclusions based on written, oral, or other media analysis [1].

B. Probing Prompting Technique

Asking questions in the classroom is a fundamental principle of good teaching. This questions is being asked to see how well he understands a lesson, evaluate its usefulness, and improve higher order thinking habits [12]. In general, there are two questioning techniques that might promote student participation and help them understand a subject during the learning process [3].

A probing question is a specific form of digging question. This question is asked to get a more detailed response or to improve the quality of the response so that it is more precise. In other words, the probing technique can help you avoid giving quick answers like yes or no [5]. A prompting question is a form of guiding question that attempts to find a better answer. If the student fails to answer the question, the teacher will try to elicit a satisfactory response by asking additional questions [12].

C. Problem-Based Learning Model

Problem-based learning is based on constructivism, a cognitive psychology theory. Students learn to develop their knowledge through interaction with their environment, according to constructivism theory [7]. Students can learn through efforts in solving real-world problems (contextual) in an organised manner using the problem-based learning model, which demands students to actively carry out investigations in order to solve them.

In general, the problems investigated in this problem-based learning model are complicated, require multiple meetings to resolve, and require the application of multiple ideas [8]. All students' participation in the learning process, as well as an increase in critical thinking skills, are expected to improve student learning results, particularly cognitive learning outcomes [13].

Using a problem-based learning approach, the learning process is structured as follows: 1) orienting students to the problem and focusing on observing the problem as a learning object. 2) Create learning activities and offer some problem-solving questions. 3) Lead independent or group investigations and gather data/experiments to solve problems. 4) Organizing and presenting the work, including associating data from experiments and other sources. 5) a review and assessment of the problem-solving approach [14].

D. Hasil Belajar

Learning outcomes are frequently used to assess a person's comprehension of material that has been taught [15]. In order to construct indicators of competency accomplishment, Bloom's revised taxonomy is employed as a guide. Bloom's taxonomy is divided into three domains: cognitive, emotional, and psychomotor [16]. Bloom claims that all brain-related tasks, such as the ability to recall, understand, analyse, apply, synthesise, assess, and be creative, are under the cognitive domain.

III. Research Methods

This is a correlational quantitative study. The purpose of correlation research is to determine whether or not each independent variable and the dependent variable have a positive correlation. The purpose of this research is to use a scientific approach to establish and assess the relationship between learning and student learning outcomes utilising probing prompting techniques and problem-based learning models. The "One-Shote Case Study" research design was used. In this research, two classes were used: experimental class 1 and experimental class 2, both of which received treatment. Table 1 summarises the research methodology.

Table 1. Research Design

Learning Approaches	Treatment	Learning Outcomes
Experiment 1 (E_1)	X_1	O_1
Experiment 1 (E_2)	X_2	O_2

All students in class XI MIPA SMAN 1 Padang and SMAN 14 Padang in the 2020/2021 academic year were included in this research. The sampling was done using a simple random sampling technique, in which each person had the equal chance of being the subject of research. Two classes (XI MIPA 5 and XI MIPA 6) at SMAN 1 Padang and two classes (XI MIPA 5 and XI MIPA

6) at SMAN 14 Padang included the sample for this research. Primary data including observations, questionnaires, and test questions were employed in this research.

The data was analysed in three stages, the first of which was a descriptive analysis of the data using the product moment correlation technique via the SPSS version 20.0 programme. which provides information on each variable's mean, median, mode, standard deviation, minimum, maximum, and sum (total score). The analysis requirements test, which includes normality, linearity, multicollinearity, and homogeneity tests, is the second stage. The third step is hypothesis testing, which involves utilising a simple correlation test and multiple regression to determine the degree of association between the independent variables (X_1 and X_2) and the dependent variable (Y).

This research's hypothesis is as follows:

a. H_0: There was no correlation between learning using the scientific approach module and students' learning results when prompting probing techniques were used.

   H_1: There is a positive correlation between learning using the scientific approach module and students' learning results when prompting probing techniques are used.

b. H_0: There is no correlation between student learning results and learning using a scientific approach module and a problem-based learning model.

   H_1: There is a positive correlation between student learning results and learning using a scientific approach module and a problem-based learning model.

c. H_0: There is no correlation between learning using the scientific approach module and the learning results of students when probing prompting techniques and a problem-based learning model are used.

   H_1: There is a positive correlation between learning using the scientific approach module and the learning results of students when probing prompting techniques and a problem-based learning model are used.

IV. Result And Discussion

A. Research Results

Student response questionnaires for the X_1 variable (learning using a reaction rate module based on a scientific approach by using the probing prompting technique) and the X_2 variable (learning using a reaction rate module with a problem based learning model) were distributed to the research sample of selected students. For statistics on student learning outcomes produced through the distribution of reaction rate test items that have been verified for validity and reliability using 30 students in trials.

1) Data Description

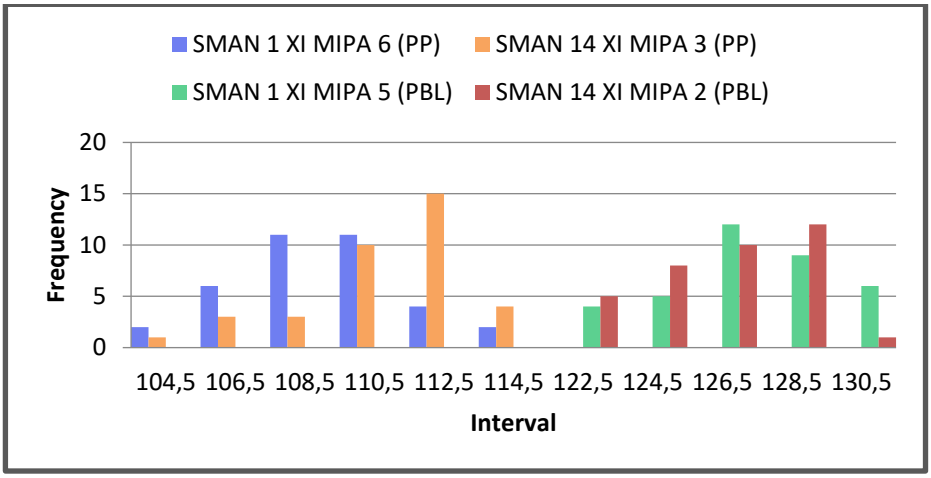
a) Learning using a Scientific Approach-Based Module by Applying Probing Prompting Techniques (X_1) and Problem Based Learning Models (X_2)

The X_1 variable consists of 24 items in the form of a student response questionnaire to learning using a scientific approach module with the probing prompting technique, with a minimum score of 24 and a maximum score of 120. The X_2 variable, which is in the form of a student response questionnaire to learning using a module with a problem-based learning model, comprises 27 statements with a minimum score of 27 and a maximum score of 135. The SPSS version 20.0 programme was used to analyse the data, and a statistical table of variables X_1 and X_2 was created, as shown in Table 2 below.

Table 2. Variable Statistics X_1 and X_2

Statistics		**Variable X_1**		**Variable X_2**	
		SMAN 1 XI MIPA 6	SMAN 14 XI MIPA 3	SMAN 1 XI MIPA 5	SMAN 14 XI MIPA 2
N	Valid	36	36	36	36
	Missing	0	0	0	0
Mean		110,25	112,08	127,83	127,25
Median		110,00	113,00	128,00	127,50
Mode		111	113	128	129
Std. Deviation		2,612	2,383	2,490	2,209
Variance		6,821	5,679	6,200	4,879
Range		11	11	9	9
Minimum		105	105	123	123
Maximum		116	116	132	132
Sum		3969	4035	4602	4581

The data can be presented in the following histogram to clarify the distribution of learning frequency data using a module based on a scientific approach by applying the probing prompting technique (X_1) and a problem based learning model (X_2).



Picture 1. Variable Histogram X_1 and X_2

Table 3 shows the level of achievement of respondents in the module variable based on a scientific approach using the Probing Prompting technique (X_1) and the Problem Based Learning (X_2) model.

Table 3. Achievement Levels on Variables X_1 and X_2 by Respondents

1)	SMAN 1 Padang Class XI MIPA 6 (variable X_1)	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{110,25}{24 \times 5} \times 100\ \%$ $= 91,8\ \%$
2)	SMAN 14 Padang Class XI MIPA 3 (variable X_1)	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{112,08}{24 \times 5} \times 100\ \%$ $= 93,4\ \%$
3)	SMAN 1 Padang Class XI MIPA 5 (variable X_2)	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{127,83}{27 \times 5} \times 100\ \%$ $= 94,6\ \%$
4)	SMAN 14 Padang Class XI MIPA 2 (variable X_2)	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{127,25}{27 \times 5} \times 100\ \%$ $= 94,2\ \%$

Based on the results of the calculation of the respondents' level of achievement in the table above, on the learning variable using a scientific approach module by applying the probing prompting technique (X_1) and classifying the achievement level category, it is known that the average level of achievement of respondents in class XI MIPA 6 SMAN 1 Padang is 91.8% and into the very high level of achievement. Meanwhile, 93.4 percent of class XI MIPA 3 SMAN 14 Padang respondents rated themselves as very good. Class XI MIPA 5 SMAN 1 Padang has a 94.6 percent and is in the very good category for learning variables using a scientific approach module using a problem based learning model (X_2). Class XI MIPA 2 SMAN 14 Padang, on the other hand, has a score of 94.2 percent, placing it in the very good category.

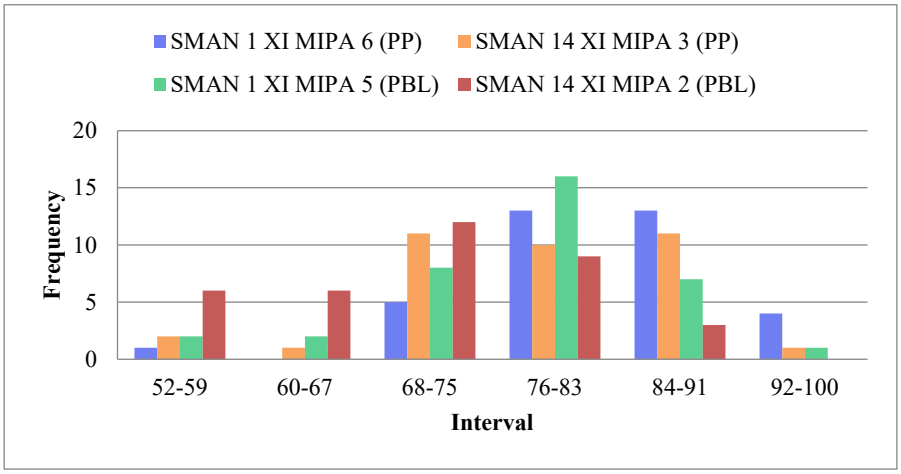
b) ***Reaction Rate to Learning Outcomes (Y)***

Variable Y in the form of 22 Reaction Rate test questions, with a minimum score of 0 and a maximum score of 100. Using the SPSS version 20.0 program, a statistical table of Y variables was created, as shown in Table 4 below.

Table 4. Variable Statistics Y

Statistik		**Variabel Y**			
		SMAN 1 XI MIPA 6	SMAN 14 XI MIPA 3	SMAN 1 XI MIPA 5	SMAN 14 XI MIPA 2
N	Valid	36	36	36	36
	Missing	0	0	0	0
Mean		83,03	78,42	77,47	71,28
Median		82,50	78,50	78,00	73,00
Mode		86	86	78	73
Std. Deviation		8,952	9,488	9.013	9,032
Variance		80,142	90,021	81,228	81,578
Range		47	40	44	36
Minimum		53	55	52	54
Maximum		100	95	96	90
Sum		2989	2823	2789	2566

The data might be presented in the following histogram to describe the distribution of the data on the frequency of reaction rate learning outcomes (Y).



Picture 2. Reaction Rate Histogram for Learning Outcomes

Table 5 shows the students' level of achievement on the variable Learning Outcomes Reaction Rate.

Tabel 5. Level of Achievement on Learning Outcomes Reaction Rate of Respondents

1) SMAN 1 Padang Class XI MIPA 6	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{83{,}03}{100} \times 100\ \%$ $= 83{,}03\ \%$
2) SMAN 14 Padang Class XI MIPA 3	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{78{,}42}{100} \times 100\ \%$ $= 78{,}42\ \%$
3) SMAN 1 Padang Class XI MIPA 5	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{77{,}47}{100} \times 100\ \%$ $= 77{,}47\ \%$
4) SMAN 14 Padang Class XI MIPA 2	$DP = \frac{\Sigma X}{n \times maximum\ scale} \times 100\ \%$ $= \frac{71{,}28}{100} \times 100\ \%$ $= 71{,}28\ \%$

According to the results of the calculation of the respondents' level of achievement in the table above, the variable reaction rate learning outcomes (Y), and the classification of achievement level categories, the average level of learning outcomes on the reaction rate material in class XI MIPA 6 SMAN 1 Padang is 83.03 percent, which is in the good category. Class XI MIPA 3 SMAN 14 Padang has a score of 78.42 percent and is classified as an enough. Padang is 77.47 percent for class XI MIPA 5 SMAN 1 and is in the enough category, while Padang is 71.28 percent for class XI MIPA 2 SMAN 14 and is in the enough category.

2) Analysis of Test Requirements

a) Normality Test

The normality test attempts to determine whether the distribution of data in each variable is normal or not. The Kolmogorov-Smirnov test was used to determine normality in this research, with calculations aided by the SPSS version 20.0 programme. With 95 percent confidence, the level of significance used is = 5% = 0.05. If the significance is greater than 0.05, the data is declared normal, and the results are shown in the asymp.Sig (2-tiled) column in Table 6 below.

Table 6. Normality Test for X1, X2, and Y Variables

One-Sample Kolmogorov-Smirnov Test

		Learning using the Scientific Approach Module by Applying the Probing Prompting Technique	Learning using Scientific Approach Module with Problem Based Learning Model	Learning Outcomes
N		72	72	144
Normal Parameters[a,b]	Mean	0E-7	0E-7	0E-7
	Std. Deviation	9,44536313	9,46504585	8,21285956
Most Extreme Differences	Absolute	,097	,079	,136
	Positive	,059	,057	,136
	Negative	-,097	-,079	-,135
Kolmogorov-Smirnov Z		,825	,674	,638
Asymp. Sig. (2-tailed)		**,504**	**,754**	**,409**

a. Test distribution is Normal.

b. Calculated from data.

Based on the data from the normality test in the table above, the Learning Using a Scientific Approach Module by Applying the Probing Prompting Technique (X_1) variable has a significance of 0.504, the Learning Using a Scientific Approach Module with Problem Based Learning Model (X_2) variable has a significance of 0,754, and the Learning Outcomes Reaction Rate (Y) variable is 0.409. Based on the findings of this analysis, the 5% significance level for the three variables in this study is higher than the 0.05 significance level. At a significance level of 0.05, we can conclude that the data is from a normally distributed population.

*b) **Linearity Test***

The linearity test for the two independent variables (X_1 and X_2) on the dependent variable was performed one by one in this research (Y). The linearity test was performed using SPSS version 20.0, with 95% confidence, then the value of = 5% = 0.05. If the significance is greater than 0.05, the data is classified as linear. The linearity test results are shown in Tables 7 and 8 below.

Table 7. Linearity Test for Learning Using the Scientific Approach Module by Using the Probing Prompting Technique (X_1) on Learning Outcomes Reaction Rate Material (Y)

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Learning Outcomes * Scientific Approach by Applying Prompting Probing Techniques	Between Groups	(Combined)	874,906	11	79,537	,873	,570
		Linearity	4,188	1	4,188	,046	,831
		Deviation from Linearity	870,718	10	87,072	,956	**,490**
	Within Groups		5463,539	60	91,059		
	Total		6338,444	71			

The significant value of the linearity of the X_1 variable to Y achieved a value of 0.490, as shown in the table above. Because the significance is greater than 0.05, the X_1 and Y variables can be assumed to have a linear connection.

Table 8. Linearity Test for Learning Using the Scientific Approach Module with Problem Based Learning Model Technique (X_2) on Learning Outcomes Reaction Rate Material (Y)

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Learning Outcomes * Problem Based Learning	Between Groups	(Combined)	477,973	9	58,108	,557	,827
		Linearity	28,191	1	28,191	,296	,589
		Deviation from Linearity	449,781	8	56,223	,590	**,783**
	Within Groups		5910,902	62	95,337		
	Total		6388,875	71			

The significant value of the linearity of the X_2 variable to Y achieved a value of 0.783, as shown in the table above. Because the significance is greater than 0.05, the X_2 and Y variables can be assumed to have a linear connection.

c) ***Multicolinearity Test***

The multicollinearity test determines if the independent variables, especially the X1 and X2 variables, have a correlation. The test that was performed was a regression test with a VIF standard value (variance inflation factor). The data on the independent variable is said to have no multicollinearity if the VIF value is less than 10 or the tolerance is more than 0.1. Table 9 shows the results of multicollinearity tests.

Table 9. Results of the Multicollinearity Test for Variable X_1 with X_2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	107,591	92,807		1,159	,250		
	Scientific Approach by Applying Prompting Probing Techniques	-,276	,447	-,078	-,617	,539	**,898**	**1,114**
	Problem Based Learning	,026	,503	,007	,052	,959	**,898**	**1,114**

Based on the data in the table above, the VIF value of learning using a scientific approach module and the probing prompting technique is 1.114, with a tolerance value of 0.898. Learning using a scientific approach module with a problem-based learning model has a VIF value of 1.114 and a tolerance value of 0.898. Because the VIF value is less than 10 or the tolerance is more than 0.1, there is no multicollinearity between the X_1 and X_2 variables.

d) ***Homogeneity Test***

The homogeneity test in this research was conducted using SPSS version 20.0 with a test of homogeneity of variance. If a significant value > 0.05, data is said to be homogeneous. Table 10 shows the results of the homogeneity test.

Table 10. The Result of Homogeneity of Learning Outcomes Reaction Rate

Test of Homogeneity of Variances

Learning Outcomes on Reaction Rate			
Levene Statistic	df1	df2	Sig.
,041	1	142	**,840**

According to the statistics in the table above, the learning outcomes have a significant value of 0.840. This value explains that the significant value obtained is > 0.005, and the reaction rate study result data can be assumed to be homogeneous.

3) **Hypothesis Test**

a) ***First Hypothesis***

The purpose of submitting this hypothesis is to see if there is a correlation between learning using a scientific approach module by using the probing prompting technique (X_1) and student learning outcomes (Y) on reaction rate content. Correlation testing was implemented in this research using SPSS version 20.0, with the following test criteria for the correlation coefficient at a significant level of 5%.

If significant < (0.05) H_0 is rejected

If significant > (0.05) H_0 is accepted

The correlation analysis results for the X_1 to Y variables can be found in Table 11 below.

Table 11. Correlation of variable X_1 to Y

Correlations

		Scientific Approach by Applying Prompting Probing Techniques	Learning Outcomes
Scientific Approach by Applying Prompting Probing Techniques	Pearson Correlation	1	**,903****
	Sig. (2-tailed)		**,000**
	N	72	72
Learning Outcomes	Pearson Correlation	**,903****	1
	Sig. (2-tailed)	**,000**	
	N	72	72

According to the table above, the correlation coefficient value is 0.903 at a significant level of 0.000, which explains why the value of sig. (0.05) accepts H_1. The correlation between student learning outcomes on the reaction rate material (Y) and learning using a scientific approach module by applying the probing prompting technique (X_1) is significantly positively correlated at the 95% confidence level of 0.903 with a very strong category [17].

The model summary table is generated using SPSS version 20.0 and contains data on how much the X_1 variable contributes to the Y variable, as seen in Table 12 below.

Table 12. *Model Summary* X_1 to Y

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,903[a]	**,815**	,814	9,513

The value of Rsquare = 0.815 is calculated using the table above. As a result, the determinant coefficient is 0.815 x 100%=81.5 percent. This indicates that the X_1 variable's effective contribution to Y is 81.5 percent.

b) ***Second Hypothesis***

The purpose of this hypothesis is to see if there is a correlation between learning using a scientific approach module and student learning outcomes (Y) on reaction rate material using a problem-based learning model (X_2). Correlation testing was implemented in this research using SPSS version 20.0, with the following test criteria for the correlation coefficient at a significant level of 5%.

If significant < (0.05) H_0 is rejected

If significant > (0.05) H_0 is accepted

The correlation analysis results for the X_2 to Y variables can be found in Table 13 below.

Tabel 13. Correlation of variable X_2 to Y

Correlations

		Problem Based Learning	Learning Outcomes
Problem Based Learning	Pearson Correlation	1	**,770****
	Sig. (2-tailed)		**,000**
	N	72	72
Learning Outcomes	Pearson Correlation	**,770****	1
	Sig. (2-tailed)	**,000**	
	N	72	72

According to the table above, the correlation coefficient value is 0.770 at a significant level of 0.000, which explains why the value of sig (0.05) accepts H1. It can be concluded that the relationship between student learning outcomes on the reaction rate material (Y) and learning using a scientific approach module with a problem based learning model (X2) is significantly positively correlated at the 95 percent confidence level of 0.770 with a strong category [17].

The model summary table is generated using SPSS version 20.0 and contains data on how much the X_2 variable contributes to the Y variable, as seen in Table 14 below.

Tabel 14. *Model Summary* X_2 to Y

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,770[a]	**,593**	,592	9,532

The value of Rsquare = 0.593 is calculated using the table above. As a result, the determinant coefficient is 0.593 x 100% = 59.33%. This indicates that the X_2 variable's effective contribution to Y is 59.3 percent.

*c) **Third Hypothesis***

The purpose of this hypothesis is to see if there is a correlation between learning using a scientific approach module by using the probing prompting technique (X1) and learning using a module with a problem-based learning model (X2) on student learning outcomes on reaction rate content (Y). Correlation testing was implemented in this research using SPSS version 20.0, with the following test criteria for the correlation coefficient at a significant level of 5%.

If significant < (0.05) H_0 is rejected

If significant > (0.05) H_0 is accepted

The correlation analysis results for the X_1 and X_2 to Y variables can be found in Table 15 below.

Tabel 15. Correlation of variable X_1 and X_2 to Y

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,770[a]	**,593**	,592	9,532

Based on the correlation and multiple regression analysis results in the table above, the multiple correlation coefficient (R_{x12y}) is 0.958, indicating a highly strong category [17]. Because the contribution is 0.918 (the Rsquare value), the determinant coefficient is 0.918 x 100% = 91.8 percent. This indicates that variables X_1 and X_2 contribute 91.8 percent of the total contribution to variable Y, with the remaining 8.2 percent impacted by other factors.

Table 16 shows the significance analysis.

Table 16. Multiple Regression of Variables X_1 and X_2 to Variable Y

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33,055	2	16,527	791,181	,000[b]
	Residual	2,945	141	,021		
	Total	36,000	143			

a. Dependent Variable: Hasil Belajar

b. Predictors: (Constant), Problem Based Learning, Pendekatan Saintifik dengan Menerapkan Teknik Probing Prompting

Based on the data in the table above, the significance value is 0.000 and this reveals that the significance value is < (0.05). This explains why the regression equation between student learning outcomes on the reaction rate material (Y) and learning using a scientific approach module by applying the probing prompting technique (X_1) and learning using a scientific approach module with a problem based learning model (X_2) is significant, in other words accept H_1.

B. Discussion

a) First Hypothesis

Based on the findings of the data analysis, it was discovered that learning using a scientific approach module while using the probing prompting technique played a significant role in students' success in achieving reaction rate learning outcomes, as evidenced by an effective contribution of 81.5 percent and a correlation coefficient of 0.903 with very strong correlation criteria [17]. Based on these data, it can be concluded that learning using a scientific approach module while using the probing prompting technique meets the required expectations and can assist students increase their reaction rate learning outcomes.

When compared to learning using a scientific approach module with a problem-based learning model, learning using a scientific approach module with the probing prompting technique produces better results and is suited for use in both schools. The correlation

coefficient between the variables X_1 and Y is substantially higher than the correlation coefficient between the variables X_2 and Y, indicating that this is the case.

b) Second Hypothesis

Based on the results, it was discovered that learning using a scientific approach module with a problem-based learning model helps students achieve learning outcomes on the reaction rate material, as evidenced by the effective contribution of 59.3 percent and the correlation coefficient of 0.770 in the strong correlation category [17]. This research shows why learning using a scientific approach module with a problem-based learning model meets the intended expectations and can assist students increase their reaction rate material learning outcomes.

c) Third Hypothesis

Based on data processing results produced through multiple regression analysis and a correlation test between X_1 and X_2 to Y, the results show that the multiple correlation coefficient between learning using a scientific approach module using the probing prompting technique and learning using a scientific approach module with a problem based learning model together on student learning outcomes on the reaction rate material (R_{x12y}) is 0.958, indicating a very strong correlation [17]. The effective contribution, or coefficient of determination, is 91.8 percent, with the remaining 8.2 percent coming from other factors.

Based on the correlation coefficient and each independent variable's effective contribution, On student learning outcomes on the material reaction rate, it can be stated that the learning variable using the scientific approach module with the probing prompting technique (X_1) provides a much higher correlation coefficient and effective contribution than the learning variable using the scientific approach module with a problem based learning model (X_2) in both schools.

Another difference can be found in the learning outcomes obtained by students on the final test. The difference in the value of learning outcomes in these two schools indicates that studying using a scientific approach module and the probing prompting technique is more desirable and capable of improving student learning outcomes. This is due to the fact that learning utilising the probing prompting technique can assist students investigate (probing) and enhance their original knowledge, after which students are guided or directed (prompting) to identify a concept.

V. CLOSING

A. Conclusion

Student learning outcomes on the reaction rate material (Y) have a significant positive relationship with the learning variable using the scientific approach module by applying the probing prompting technique (X_1), as indicated by a correlation coefficient of 0.903 with very strong correlation criteria. This shows that learning using a scientific approach module and the probing prompting technique can assist students improve their learning outcomes on the reaction rate content, as indicated by the 81.5 percent effective contribution.

The learning variable employing a scientific approach module with a problem-based learning model (X_2) shows a substantial positive link to student learning results on the reaction rate material (Y), as evidenced by a correlation coefficient of 0.770 using strong correlation criteria. This demonstrates that learning with a scientific approach module and a problem-based learning model can help students enhance their learning outcomes, as indicated by the effective contribution of 59.3 percent.

Learning variables from a scientific approach module that use the probing prompting technique (X1) and learning variables from a scientific approach module that use a problem based learning model (X2) have a significant positive relationship to student learning outcomes on the reaction rate material (Y), which is shown by a correlation coefficient of 0.958 using very strong correlation criteria, and the effective contribution is 91.8 percent. Furthermore, in the two schools where this research was conducted, learning using a scientific approach module and the probing prompting technique resulted in better learning outcomes. This is evidenced by the fact that the average score on the student learning outcomes test for class XI MIPA 6 at SMAN 1 Padang is 83.03, which is higher than the average value for students in class XI MIPA 5, which is 77.47. The similar situation happened at SMAN 14 Padang, where the average value of student learning outcomes in class XI MIPA 3 was 78.42, which was greater than the average value of students in class XI MIPA 2, which was 71.28.

B. Suggestion

Teachers of chemistry are expected to be able to apply the probing prompting technique to the scientific approach module, or a scientific approach module with a problem-based learning model on reaction rate content as an alternative medium that may be used in the learning process to make students more engaged and motivated to learn in order to improve their learning outcomes.

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