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Analysis Of High School Motivation and Learning Outcomes Using the PBL and DL Model Based on Ispring Presenter

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Abstract: This study was motivated by the difficulties students at SMA Negeri 13 Medan faced in grasping the abstract and theoretical concepts of chemical bonding, which negatively impacted their motivation and learning outcomes. The study aimed to analyze significant differences in student motivation and learning outcomes, as well as the correlation between the two, through the implementation of innovative, technology-based learning models. A quasi-experimental method was employed with a sample comprising two classes: Experimental Class 1 (using the PBL model) and Experimental Class 2 (using the DL model), both supported by iSpring Presenter software. Hypothesis testing using an independent sample t-test resulted in the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (Ha) for both motivation and learning outcomes. Furthermore, correlation analysis based on the product-moment formula also led to the rejection of H_0 (acceptance of Ha) for both experimental classes. Data analysis indicates that the iSpring Presenter-based PBL model was more effective than the DL model in enhancing students' motivation and chemistry learning outcomes, and that a significant, positive linear correlation exists between motivation and learning outcomes.

Keywords: PBL; DL; ispring presenter; learning motivation; learning outcomes

1. INTRODUCTION

Education is very important for the development of the nation and improving the quality of human resources that can keep up with the times. The learning process not only focuses on cognitive outcomes, but also on developing students' attitudes, skills, and motivation [1]. Chemistry learning in high school plays an important role in building students' scientific understanding and logic of thinking [2].

Students have difficulty understanding chemical bonds due to abstract and monotonous teaching, especially at State Senior High School 13 Medan. The conventional lecture method is also not interesting and results in low learning outcomes. Therefore, an innovative learning model that is interesting and able to relate chemistry to real life for problem solving is needed [3].

The Problem Based Learning (PBL) and Discovery Learning (DL) learning models are relevant because they are student-centered, actively involve them, and are able to improve learning outcomes, motivation, creativity, and critical thinking skills [4].

According to research [5] states that problem-based learning models improve learning outcomes, which is indicated by the value of post-test the experimental class (85.99) which was higher than the control class (51.73). Research [6] It also proves the effectiveness of the problem-based learning model in improving learning outcomes, with the t_{value} (4.318) greater than the t_{table} (1,701). This aligns with research conducted by [7], which found that the learning outcome for the class using the PBL model was 81.14 higher than that of the class not using the PBL model (76.97) and that a calculated t_{value} of 2.4046 and t_{table} value of 1.9893 were obtained.

Based on research [8] prove that the model discovery learning It has an effect on improving student learning outcomes, with a t_{value} (3.63) greater than t_{table} (1.679). [9] state that instruction using the Discovery Learning model can improve student learning outcomes, where the calculated t_{value} exceeds the t_{table} value (12.984 > 2.262). Research by [10] It also proves that the discovery learning model has a significant effect on student activity (t_{value} 5.246 > t_{table} 1.6765; significance 0.000 < 0.05) and students' critical thinking skills (t_{value} 3.853 > t_{table} 1.6765; significance 0.000 < 0.05).

In addition to the media learning model used based on technology such as iSpring presenter can improve students' understanding by presenting material visually, interestingly, and interactively through text, images, audio, video, and quizzes, thus supporting active [11].

Research by Research by [12] prove that the use of technology-based learning media, namely iSpring presenter, can significantly improve student learning outcomes, with the results of counting (8.68) > ttable (1.684). Proving that the use of technology-based learning media, namely iSpring presenter, can significantly improve student learning outcomes, with t_{value} (8.68) > t_{table} (1.684). [13] research also shows that the use of learning media iSpring presenter It has a significant influence on student learning outcomes (t_{value} 3.5359 > t_{table} 1.699) with an increase in learning outcomes of 59.8% (medium category), and the average student learning motivation reaches 71.967 (high criteria).

Although many studies support the use of digital media, few have specifically examined the influence of iSpring presenters on motivation and learning outcomes in chemical bonding materials in high school. This encourages the need for such research at State Senior High School 13 Medan. Therefore, the researcher was encouraged to conduct a study entitled "Analysis of Motivation and Learning Outcomes of High School Using the PBL and DL Model Based on Ispring Presenter."

2. METHOD

This research was carried out at State Senior High School 13 Medan which is located at Karya Bersama St., Titi Kuning, Medan Johor District, Medan City, North Sumatra Province 20147 in the 2025/2026 school year will be held from December 2025 – February 2026. Judging from the population that became the population in the study, the target population was all grade XI students at SMA Negeri 13 Medan which consisted of 12 classes (Classes XI-8 to XI-12). Each class averages 36 students. The samples in this study were taken from 2 classes from all classes XI at SMA Negeri 13 Medan which were obtained by purposive sampling technique from the 12 classes, 2 classes were taken which will be used as research samples. In experimental class 1, it was taught by applying the Problem Based Learning (PBL) learning model based on iSpring presenter and in experiment class 2 it was taught with the Discovery Learning (DL) model based on iSpring presenter media. For class XI-8, which is experimental class 1, there are 36 students, while for class XI-9, which is experimental class 2, there are also 36 students. This research is included in the type of quantitative research with the true experiment method. This study uses a quantitative method with a "Two Group Pretest-Posstest Design" design. The "Two Group Pretest-Posstest Design" is a design that compares learning outcomes between experimental class 1 and experimental class 2 through measurements taken before and after treatment [14]. In this design, there are two groups, experimental group 1 which was treated using the Problem Based Learning (PBL) model and experimental group 2 which used the Discovery Learning (DL) model. The research design uses the design as shown in Table 1.

Table 1. Research Design

Classes	Initial Results	Actions	Final Results
Experiment 1	T_1	X	T_2
Experiment 2	T_1	Y	T_2

With
T_1 : Pre-test
T_2 : Post-test
X: Learning with the Problem Based Learning (PBL) model based on iSpring presenter media
Y: Learning with the iSpring presenter's media-based Discovery Learning (DL) model

In this study, there are two data collection techniques, namely test data collection techniques and non-test data. The test data collection technique is by using a test instrument of 20 objective questions regarding reaction speed material that has been validated by expert validators, while the non-test data collection technique is carried out by measuring the psychomotor aspect of students, namely student learning motivation, where this non-test instrument is in the form of a questionnaire given to students. The research procedure can be seen in figure 1. below.

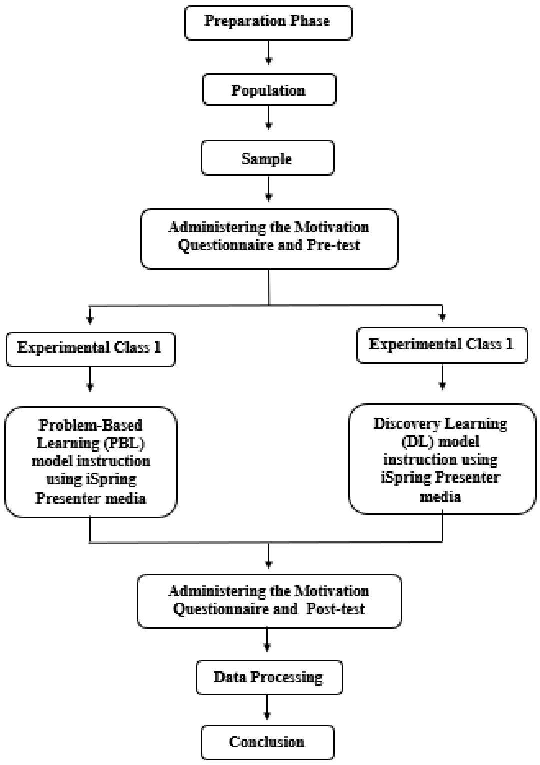

Figure. 1 Scheme of the research procedure

3. RESULTS AND DISCUSSION

The normality test was carried out to find out whether the data on learning motivation and student learning outcomes were distributed normally or not. The normality test used with the Chi Square Test, the initial step is determined the interval class, class length and arranged into a helper table. The data is said to be normally distributed when the value of X^2_{value} < X^2_{table} at $\alpha = 0.05$ and df = 5 [15]. The results of the normality test data on student learning motivation can be seen in Table 2.

Table 2. Normality Test Data for Students' Learning Motivation

Classes	Test	X^2_{val}	X^2_{tab}	a	Information
Ex 1	Beginning	9.08	11.07	0.05	Normal
	End	3.75	11.07	0.05	Normal
Ex 2	Beginning	9.28	11.07	0.05	Normal
	End	6.6	11.07	0.05	Normal

The results of the normality test data on student learning motivation can be seen in Table 3.

Table 3. Normality Test Data for Students' Learning Outcomes

Classes	Test	X^2_{val}	X^2_{tab}	a	Information
Ex 1	Pre	8.41	11.07	0.05	Normal
	Post	5.63	11.07	0.05	Normal
Ex 2	Pre	7.53	11.07	0.05	Normal
	Post	10.75	11.07	0.05	Normal

Based on the table above, the results of the normality test show that all research data are distributed normally. The fulfillment of this assumption of normality indicates that the data is feasible to analyze using parametric statistics, especially the t-test for testing the research hypothesis.

The homogeneity test was carried out to ensure that the data variants of student learning outcomes and motivation between experimental class 1 (PBL model) and experimental class 2 (DL model) had the same level of uniformity before the average comparison test was conducted. The homogeneity test was carried out by calculating the variance and standard deviation of the sample. If $F_{value} < F_{table}$ with $\alpha = 0.05$ and (df = (n1 – 1) (n2 – 1) then H_0 accepted (homogeneous data) [16]. Results of the homogeneity test of student learning motivation show the value of the variance of the two classes is relatively similar at both the beginning and the end can be seen in Table 4.

Table 4. Results of the Student Learning Motivation Homogeneity Test

Test	S^2		F_{val}	F_{tab}	Information
	Ex 1	Ex 2			
Beginning	74.05	66.11	1.120	1.757	Homogeneous
End	31.54	36.06	1.143	1.757	Homogeneous

Meanwhile, the results of the homogeneity test data of student learning outcomes show that the value of variance between the two classes is relatively similar in both the pre-test and post-test can be seen in Table 5.

Table 5. Results of the Homogeneity Test of Student Learning Outcomes

Test	S^2		F_{val}	F_{tab}	Information
	Ex 1	Ex 2			
Pre	149.2	131.8	1.023	1.757	Homogeneous
Post	66.25	46.40	1.427	1.757	Homogeneous

Based on the table above, the variance homogeneity test shows that the motivation data and learning outcomes in both groups have homogeneous variance.

Hypothesis test 1 that applies the test independent sample t-test Namely, the two-party T-test aims to determine whether there is a significant difference between the two averages, both in higher and lower forms. If the $t_{value} > t_{table}$ of Significanceα = 0,05 dan df = n1 + n2 - 2, then the null hypothesis (H_0) is rejected (and the alternative hypothesis Ha is accepted), which indicates a significant difference. Conversely, if $t_{hitung} \leq t_{table}$, then H_0 is accepted (and Ha is rejected), which means there is no significant difference [17].

The Ha hypothesis that will be tested is the learning motivation of students in experimental class 1 and experimental class 2. Then the calculations and ttables produced in Table 6 are calculated.

Table 6. Hypothesis Test Data Results 1 (Learning Motivation)

Classes	$\bar{X}$	S^2	t_{val}	t_{tab}	Information
Ex 1	80.41	66.25	2.98	1.99	H_0 rejected (Ha accepted)
Ex 2	75.13	46.40			

Based on the calculation results, it is concluded that t_{value} (2.98) > t_{table} (1.99), then H_0 is rejected (Ha is accepted) which means that there is a significant difference in the learning motivation of students who are learned using the iSpring presenter's media-based Problem Based Learning (PBL) model compared to the learning motivation of students who are learned using the model Discovery Learning (DL) based on iSpring presenter media on chemical bonding materials.

Hypothesis test 2 which applies a two-party t-test aims to determine whether there is a significant difference between the two averages, either in a higher or lower form. If the $t_{value} > t_{table}$ of Significanceα = 0,05 dan db = n1 + n2 - 2, then the null hypothesis (H_0) is rejected (and the alternative hypothesis Ha is accepted), which indicates a significant difference. and if $t_{value} \leq t_{table}$, then H_0 is accepted (and Ha is rejected), which means there is no significant difference. The Ha hypothesis that will be tested is the learning outcomes of students in experimental class 1 and experimental class 2. Then it is calculated Count and table generated in Table 7.

Table 7. Hypothesis Test Data Results 1 (Learning Motivation)

Classes	$\bar{X}$	S^2	t_{val}	t_{tab}	Information
Ex 1	82.37	1104.18	2.47	1.99	H_0 rejected (Ha accepted)
Ex 2	78.98	1262.24			

Based on the results of the calculation, it is concluded that the t_{value} (2.47) > t_{table} (1.99), then H_0 is rejected (Ha is accepted) which means that there is a significant difference in the learning motivation of students who are learned using he iSpring presenter-based Problem Based Learning (PBL) model compared to the learning outcomes of students who are learned using the model Discovery Learning (DL) based on iSpring presenter media on chemical bonding materials.

Hypothesis test 3 uses correlation analysis, which is to measure how closely the relationship between variable X (learning outcomes) and variable Y (learning motivation) in experimental class 1 and experimental class 2. To calculate a simple correlation is used the formula product moment at free degrees, df = N-2 and = 0.05 and using regression linearity analysis, a significance value of < 0.05 indicates a linear relationship between the variables [18].

Researchers can use this correlation analysis to calculate the coefficient of determination that shows how strong the correlation between learning motivation and student learning outcomes is. The hypothesis test data can be seen in Table 8.

Table 8. Correlation Test Data Results

Classes	R_{val}	R_{tab}	a	CD	Case.	Category
Ex1	0.858	0.329	0.05	73.78 %	Ha accepted	Very High
Ex2	0.797	0.329	0.05	63.67 %	Ha accepted	Height

In experimental class 1, the calculation = 0.858928 was obtained, while the r_{table} at $\alpha = 0.05$ and N = 36 was 0.329. It

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can be concluded that the $r_{value} > r_{table}$ then H_0 is rejected (Ha is accepted) which means that there is a linear and significant correlation between learning motivation and the learning outcomes of students learned with the Problem Based Learning (PBL) model. As well as the contribution of learning motivation to the learning outcomes of students who were taught with the Problem Based Learning (PBL) model based on the iSpring presenter media and on chemical bonding materials was 73.78% while 26.22% were other factors.

In experimental class 2, r_{value} = 0.797953 was obtained, while the r_{table} at α = 0.05 and N = 36 was 0.329. It can be concluded that the $r_{value} > r_{table}$ then H_0 is rejected (Ha is accepted) which means that there is a linear and significant correlation between learning motivation and learning outcomes of students learned with the Problem Based Learning (PBL) model. As well as the contribution of learning motivation to the learning outcomes of students who were taught with the Discovery Learning (DL) model based on the iSpring presenter media and on chemical bonding materials was 63.67% while 36.33% were other factors.

Subsequently, a linearity test was conducted using SPSS 26; the ANOVA table yielded a linearity significance value of 0.00 (< 0.05) and a deviation from linearity value of 0.767 (> 0.05) for Experimental Class 1, demonstrating a significant linear correlation between motivation and student learning outcomes. The results of the linearity test are presented in Table 9.

Table 9. ANOVA Linearity Test Data Results for Experimental class 1

		SS	df	MS	F	Sig.
Between Groups	(Combained)	845.04	7	120.72	13.043	.000
	Linearity	814.62	1	814.62	88.017	.000
	Deviation from Linearity	30.417	6	5.070	548	.767
Withing Groups		259.148	28	9.255		
Total		1104.188	35			

The scatter plot showing the relationship between Learning Motivation (X-axis) and Learning Outcomes (Y-axis) for Experimental Class 1 is as follows.

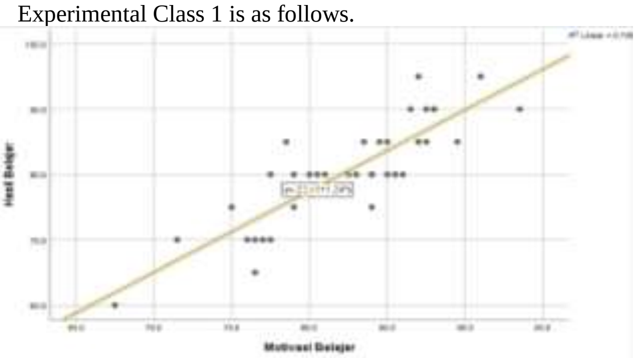

Figure. 2 Linearity test graph for experimental class 1

The graph reveals a significant positive linear relationship between learning motivation (the independent variable) and learning outcomes (the dependent variable), as represented by the regression equation (y =-22.11 + 1.24x). The upward trend of the data to the right indicates that an increase in learning motivation is consistently accompanied by an improvement in students' learning outcomes. Furthermore, the coefficient of determination (R^2) of 0.738 demonstrates that learning motivation exerts a strong influence, accounting for 73.8% of the variation in learning outcomes, while the remaining variation is attributable to factors outside the scope of this study.

In experimental class 2, a linearity test yielded a linearity significance of 0.00 (< 0.05) and a deviation from linearity of 0.453 (> 0.05), demonstrating a significant linear correlation between motivation and student learning outcomes. The results of the linearity test are presented in Table 10.

Table 10. ANOVA Linearity Test Data Results for Experimental class 2

		SS	df	MS	F	Sig.
Between Groups	(Combained)	869.347	6	144.891	10.695	.000
	Linearity	803.707	1	803.707	59.322	.000
	Deviation from Linearity	65.641	5	13.128	969	.453
Withing Groups		392.896	29	13.548		
Total		1262.243	35			

The scatter plot showing the relationship between Learning Motivation (X-axis) and Learning Outcomes (Y-axis) for Experimental Class 2 is as follows.

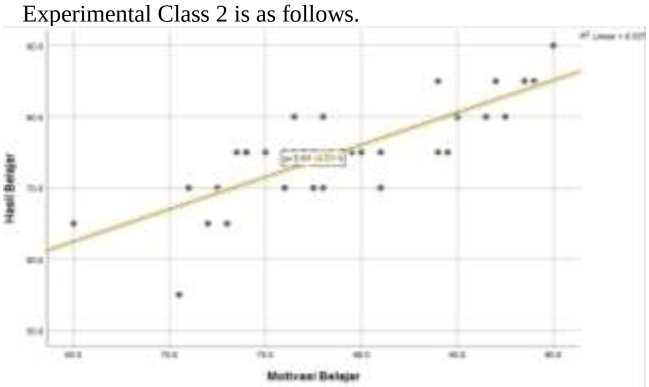

Figure. 3 Linearity test graph for experimental class 2

The graph reveals a significant positive linear relationship between learning motivation (the independent variable) and learning outcomes (the dependent variable), as represented by the regression equation (y = 3.64 + 0.91x). The upward trend of the data to the right indicates that an increase in learning motivation is consistently accompanied by an improvement in students' learning outcomes. Furthermore, the coefficient of determination (R^2) of 0.637 demonstrates that learning motivation exerts a strong influence, accounting for 63.7% of the variation in learning outcomes, while the remaining variation is attributable to factors outside the scope of this study.

Based on the data obtained from experimental class 1 and experimental class 2, it can be concluded that the null hypothesis (H_0) was rejected (and the alternative hypothesis, Ha, accepted) in both cases; this indicates a significant linear correlation between learning motivation and the learning outcomes of students taught using the Problem-Based Learning (PBL) and Discovery Learning (DL) models supported by iSpring Presenter media on the topic of chemical bonding.

4. CONCLUSION

Based on the research findings, it can be concluded that there is a significant difference in the learning motivation and learning outcomes of students taught using the Problem-Based

Learning (PBL) model supported by iSpring Presenter media compared to those taught using the Discovery Learning (DL) model supported by iSpring Presenter media regarding the topic of chemical bonding. Furthermore, there is a significant linear correlation between learning motivation and learning outcomes for students taught using the Problem-Based Learning (PBL) and Discovery Learning (DL) models supported by iSpring Presenter media on the topic of chemical bonding.

5. ACKNOWLEDGEMENTS

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