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Comparison of Learning Outcomes Using Models Media Assisted Problem Based Learning on Materials Supporting Solution Class XI Senior High School

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Abstract: The aim of this study was to find out the differences in student learning outcomes taught using the Problem Based Learning (PBL) model using Powtoon media and Powerpoint media. This method of research is a quasi-experimental research with a non-equivalent control group design. The research sample was taken randomly from a homogeneous population, namely 2 classes XI MIA 2 and XI MIA 3 with a total of 64 students.The N-gain result for the experimental class I was 0.73% and for the experimental class II was 0.63%, based on the results of the experimental class I which was included in the high category. It was obtained that the average value of student learning outcomes in experimental class I was 84.38 while in experimental class II was 77.81 so that there was a significant difference in the value of student learning outcomes using the Problem Based Learning learning model assisted by Powtoon and Powerpoint media.

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Problem Based Learning (PBL), Powtoon, Powerpoint, Learning Outcomes, Buffer Solutions.

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Introduction

The 21st century demands students' higher order thinking skills. Science learning is oriented towards achieving 21st century competencies, in which students are expected to have high comprehension skills and be able to think critically (Septiani, D. 2021). Based on PISA (Program for International Student Assessment) data, the scientific literacy ability of Indonesian students is still below average. The latest results of PISA achievements, namely 2018, Indonesia ranked 73rd out of 78 participating countries, and received a science score of 396 (Masfufah, R. 2021).

Based on the results of initial interviews conducted at SMA Negeri 1 Pulau Rakyat, it was found that chemistry learning at school was still dominant using conventional learning models and using PPT (powerpoint) learning media. Researchers also found learning media such as projectors in schools were not always used during the learning process, so that the learning conditions caused students to be inactive. Student learning outcomes are also still relatively low with an average score of 60 while the applicable KKM chemistry score is 75.

Jami's research (2020) proved that the PBL model succeeded in increasing the learning outcomes of class XI MIA students in the chemistry subject matter of acids and bases, which was initially 54.76 to 81.52. Apart from that Jayadiningrat, (2018) also proved

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that the PBL model succeeded in increasing the learning outcomes of class XI high school students in chemistry subjects. It was found that the final skills result was 83.05% with very high criteria and exceeded the success indicators.

Some research shows that the role of learning models will increase when combined with learning media. Hidayah N. (2021) states that Powtoon media based on the PBL model is appropriate for use as a learning medium and can help improve mastery of subject matter concepts. Then, Trisna (2021) stated 3 that learning videos assisted by the powtoon application are very good qualifications and are appropriate for use to support PBM.

In addition to powtoons, several researchers also conducted research using powerpoint media, among them, Nainggolan (2019) stated that there was an increase in students' chemistry learning outcomes through the PBL model learning using PowerPoint media which was higher than PBL model learning without powerpoint media. It was found that the learning outcomes of the experimental class (52.38%) were higher than the increase in learning outcomes of the control class (45.72%). This study aims to find out Comparison of Learning Outcomes Using the Media-Assisted Problem Based Learning Model on Class XI High School Buffer Solution Material.

Research Method

The research was conducted at SMA Negeri 1 Pulau Rakyat. The research was conducted from November to February 2022/2023.Samples were randomly selected from a homogeneous population of 64 students in class XI MIA 2 and XI MIA 3. In the study, the researchers used a quasi-experimental type of research (quasi-experimental) with a non-equivalent control group design research design in the form of learning outcomes data.

Table 1. Research design

No	Group	Pretest	Treatment	Posttest
1	Experiment I	T1	Y	Q1
2	Experiment II	T2	Y	Q2

In the research instrument used is an objective test in the form of multiple choice with 5 answer choices and 1 appropriate and correct answer. The instrument consists of 20 questions.

Method The test in this study is by carrying out the pretest and posttest. The questions distributed in the form of multiple choices were used to measure student learning outcomes in the buffer solution material after being tested using the Problem Based Learning learning model based on Powtoon and Powerpoint media. To find a comparison of learning outcomes for the 64 students after using the Problem Based Learning learning model based on Powtoon and Powerpoint media during the learning process, the researchers carried out a hypothesis test using a two-sample t-test. Before carrying out the N-Gain test and hypothesis testing, the researcher must first ensure that the data obtained is otherwise normally distributed by carrying out the normality test. After that, the researcher must also ensure that the data

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obtained has a homogeneous variance or comes from a homogeneous population by carrying out a homogeneity test.

Result and Discussion

Pretest and posttest data in Experiment I class were carried out using the PBL learning model assisted by Powtoon media and in Experiment II class the same actions were carried out using the PBL model only with the help of Powerpoint. The following is presented in the table of results from the pretest and posttest in both classes.

Table 2. Pretest and Posttest Data of Experimental Class I and Experimental Class II students

Class	N	Pretest	Posttest
Experiment I	32	43,28	84,38
Experiment II	32	40.94	77,81

In Table 3 it can be seen that the data on student learning outcomes were found after the data was tabulated, the average, standard deviation, and variance of the pretest and posttest of Experiment I and Experiment II classes were obtained as shown in the table below.

Table 3. Mean, Standard Deviation, and Variance of Pretest and Posttest Data

Data	Statistics	Class	
		Experiment I	**Experiment II**
Pretest	Average	43,28	40.94
	Standard Deviation	10,12	9,22
	Variance	105,82	87.8
Posttest	Average	84,38	77,81
	Standard Deviation	6,47	8.65
	Variance	43,1	77

So that it can be described the acquisition of the average pretest and posttest scores in the Experimental class I and Experimental class II in Figure 1 below

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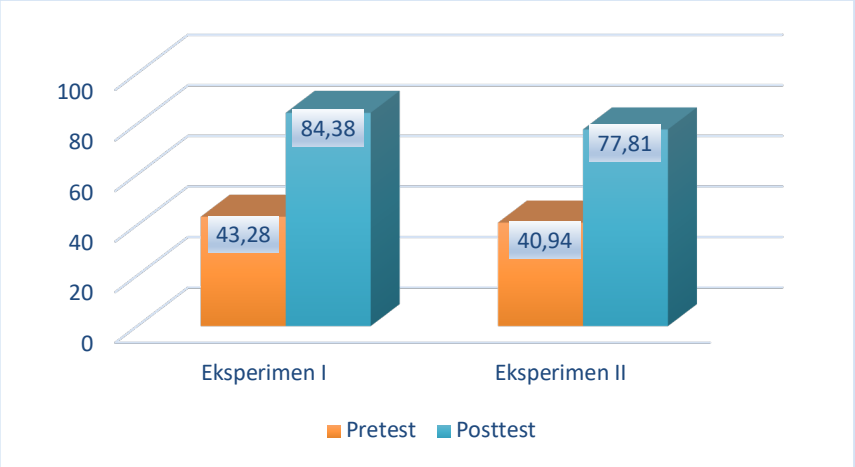

Figure 1. Diagram of Pretest and Posttest Average Scores of Experimental Class I and Experimental Class II students

Based on Table 4, it can be seen that the results of the data normality test (pretest and posttest) in both classes used the Chi-Square Test at the significant level $\alpha = 0.05$ with the Chi Square criterion $X^2_{count} < X^2_{table}$ so that the data is normally distributed.

Table 4. Data Normality Test

Class	Data source	X2count	X2table	α	Information
Experiment I	Pretest	10.88	11.07	0.05	Normal
	Posttest	8,62	11.07	0.05	Normal
Experiment II	Pretest	10.66	11.07	0.05	Normal
	Posttest	9.98	11.07	0.05	Normal

The results of the calculation for the homogeneity test for the pretest and posttest data for both Experimental I and Experiment II classes by comparing Fcount and Ftable are said to be homogeneous if the value of $F_{count} < F_{table}$ at a significance level $\alpha = 0.05$ can be seen in Table 5 below.

Table 5. Sample Homogeneity Test

Data source	Class	S2	Fcount	Ftable	Information
Pretest	Experiment I	105,82	1.21	1.82	Homogeneous
	Experiment II	87.8			
Posttest	Experiment I	43,1	0.56	1.82	Homogeneous
	Experiment II	77			

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To see a comparison of student learning outcomes using the media-assisted Problem Based Learning (PBL) model on buffer solution material by 64 students in the experimental class, the researchers carried out the N-Gain test related to student learning outcomes (pretest and posttest). As for the results of the N-Gain test on student learning outcomes (pretest and posttest).

Table 6. Improved Learning Outcomes

Class	Criteria	Average gains	% Enhancement Learning Outcome (Gain)
Experiment I	G < 0.3 = Low 0.3 ≤ g ≥ 0.7 = moderate	0.73	73%
Experiment II	G > 0.7 = high	0.63	63%

Based on Table 6, the results of increasing student learning outcomes in the experimental class I were 71% higher than the increased learning outcomes in the experimental class II by 65%. so, the difference in increasing student learning outcomes in the experimental class I and the experimental class II is 6%.

Hypothesis testing was carried outin order to find out whether the implementation of Media-assisted Problem Based Learning (PBL) Models on buffer solution material can improve student learning outcomes or not. This hypothesis test is carried out using a statistical test, namely the two-party t test. The t-test was carried out in order to find out whether the alternative hypothesis (Ha) was accepted or rejected. If tcount ≥ ttable then the alternative hypothesis (Ha) is accepted and the null hypothesis or null hypothesis (Ho) is rejected. Conversely, if $t_{count} \leq t_{table}$ then Ho is accepted. Degrees of freedom (db) = $(n_1 + n_2) - 2$ and $\alpha = 0.05$. The data from the hypothesis test results can be seen in table 7 below:

Table 7. Results of Hypothesis Testing Data on Learning Outcomes

Class Data				
Experiment I	Experiment II	T_{count}	T_{table}	Information
Ẍ= 84,38 S= 6,57 S^2 = 46,24	Experiment I Experiment II Experiment I	3,36	1,99934	Ha accepted Ho rejected

So it can be seen that the value obtainedtcount ≥ ttable so that it can be stated that Ha is accepted and Ho is rejected. It can be concluded that in this study the alternative hypothesis (Ha) is accepted. With this it can be proven that there is a comparison of student learning

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outcomes in the use of media-assisted Problem Based Learning (PBL) models on class XI buffer solution material.

Conclusion

Based on the research results, it can be concluded that there is a significant difference in the average value of student learning outcomes using the Problem Based Learning (PBL) learning model assisted by Powtoon and Powerpoint media on Buffer Solution material. In the experimental class I, the average value of student learning outcomes was 84.38, while in the experimental class II it was 77.81. With this it can be stated that there is a difference in increasing student learning outcomes in the use of the Media-assisted Problem Based Learning (PBL) model on material buffer solution class XI SMA.

Recommendation

For teachers and prospective teachers, so that they can apply the Problem Based Learning (PBL) learning model assisted by Powtoon learning media to be able to improve student learning outcomes better.

For further research so that they can also conduct research involving other objective aspect variables such as the use of different learning models and media in an effort to improve student learning outcomes which are increasingly qualified, especially in Chemistry lessons.

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