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The Influence of Learning Models and Media on Students' Activities and Learning Outcomes on Acid-Base Materials in High School

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Abstract: The Influence of Learning Models and Media on Students' Activities and Learning Outcomes on Acid-Base Materials in High School. This research aims to determine the influence of learning models, media, and the interaction between learning models and media on student learning activities and outcomes. The population in this study were all students of class XI MIPA at SMA Negeri 17 Medan, namely 6 classes. The sample for this research was taken randomly from 4 classes and the student sample was taken purposively, 10 people per class based on the homogeneity of their status. This research uses a 2 x 2 factorial design. Two factors are tested, namely factor A: Learning Model which consists of two levels, namely A_1 = Discovery learning A_2 = Guided inquiry, and factor B: learning media which consists of two levels, namely B_1 = Video, B_2 = PowerPoint. Learning acid-base material in high school which combines the guided inquiry learning model and video media provides higher activity and learning outcomes compared to the activities and learning outcomes of students who are taught by combining the guided inquiry model with PowerPoint, the combination of discovery learning model with PowerPoint or a combination Discovery Learning model with video.

Keywords: Discovery Learning, Guided Inquiry, Video, PowerPoint, Learning Results and Activities, Acids and Bases

Abstrak : Pengaruh Model Pembelajaran dan Media terhadap Aktivitas dan Hasil Belajar Siswa pada Materi Asam-Basa di SMA. Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran, media, serta interaksi antara model pembelajaran dan media terhadap aktivitas dan hasil belajar siswa. Populasi dalam penelitian ini adalah seluruh siswa SMA Negeri 17 Medan yakni sebanyak 6 kelas. Sampel penelitian ini diambil secara acak sebanyak 4 kelas dan sampel siswa diambil secara purposive 10 orang per kelas berdasarkan kehomogenan statusnya. Penelitian ini menggunakan rancangan faktorial 2 x 2. Ada dua faktor yang diujicobakan yaitu faktor A : Model Pembelajaran yang terdiri dari dua taraf yaitu A_1 = Discovery learning A_2 = Inkuiri terbimbing, faktor B : media pembelajaran yang terdiri dari dua taraf yaitu B_1 = media video, B_2 = media powerpoint. Pembelajaran materi asam basa di SMA yang mengkombinasikan perlakuan model pembelajaran Inkuiri terbimbing dan media video secara nyata memberikan aktivitas dan hasil belajar yang lebih tinggi dibandingkan dengan aktivitas dan hasil belajar siswa yang dibelajarkan dengan mengkombinasikan model inkuiri terbimbing dengan media powerpoint, kombinasi *Discovery Learning* dengan media PowerPoint maupun kombinasi model *Discovery Learning* dengan media video.

Kata kunci: *Discovery Learning, Inkuiri Terbimbing, Video, PowerPoint, Hasil dan Aktivitas Belajar, Asam Basa*

▪ INTRODUCTION

Chemistry is one of the most important subjects taught to high school students because chemistry can improve students' thinking abilities and stimulate creative thinking patterns (Rachman et al., 2017). The reality shows that chemistry is a field of science that is less popular among students because it is considered a subject that is difficult to understand and the material is boring (Muderawan et al., 2019)

The main problem students face in understanding chemistry learning is that the material contains many abstract and complex concepts so they need in-depth understanding (Sariati et al., 2020). Some of the difficulties experienced by students in studying chemistry include connecting between concepts which requires the ability to utilize logic, mathematics, and language skills (Zakiyah et al., 2018). Besides that, difficulties in learning chemistry are often caused by the large use of mathematical calculations in solving problems. Several research results show that internal and external factors also cause students' learning difficulties in chemistry learning. Internal factors include low interest in learning and motivation to learn chemistry. External factors include the lack of adjusting the learning methods and strategies applied by teachers in class to students' abilities, the way teachers monitor chemistry lessons, the influence of friends, and less effective chemistry study time (Muderawan et al., 2019). Based on the results of initial observations and interviews conducted by researchers at SMA Negeri 17 Medan, data was obtained that in the chemistry learning process, especially in acid-base material, there was a lack of student activity during the learning process, especially for students with low learning motivation. The learning models applied by teachers in the learning process vary. For classes with a poor understanding of learning, teachers use conventional models, meanwhile, for classes with a good understanding of learning, teachers use Contextual Teaching Learning (CTL) and Problem-Based Learning (PBL) learning models. Students' daily test scores on acid-base material are not optimal because the percentage of students who pass the Minimum Completeness Criteria (KKM) is only around 60%.

Student learning activities in general can be enhanced by the use of multimedia which in turn will improve their learning outcomes. The use of multimedia in learning can make it easier for students to learn, and the time used is more effective and efficient. Animated videos have a great impact on learning because they are proven to attract attention, increase engagement, and visualize imaginary concepts, objects, and their relationships. (Puspita, 2017).

Although many researchers have carried out research applying the guided inquiry learning model and the discovery learning model, to date research on the combination of these two learning models with video media and PowerPoint (PPT) media, especially for acid-base material, has never been researched.

▪ METHOD

The approach used in this research is quantitative. The type of research used is a quasi-experimental design (quasi-experimental). According to Sugiyono (2010:107), "The experimental method can be interpreted as a research method used to study the effect of a particular treatment on other treatments under controlled conditions. This design does not control variables as completely as a real experiment. Even though this research design has a control group, it does not fully function to control external variables that influence the implementation of the experiment (Sugiyono, 2008: 114).

This research was carried out at SMA Negeri 17 Medan which is located on Jl. Jamin Ginting KM 13, RW.5, Lau Cih, Kec. Medan Tuntungan, Medan City, North Sumatra 2023/2024 Academic Year from January to March 2024.

The population of this study were all students of class XI MIPA SMA Negeri 17 Medan 2023/2024 academic year which consists of 6 classes and a total of 216 students. Sampling was carried out in two stages, namely in the first stage, 4 classes were taken at random from parallel classes in the school where the research was conducted. In the second stage, samples were taken by purposive sampling with a total of 10 students in each class who were relatively homogeneous in status. The homogeneity of the student sample can be seen from several factors, namely: similarity of pretest results, participation in private/tutoring, learning support facilities owned, and school background.

This research used a 2x2 factorial design, namely an experimental design combining two or more factors. There are 2 factors studied, namely the learning model factor (A) and the learning media factor (B). Factor A has 2 levels, namely Discovery Learning and Guided Inquiry. Meanwhile, factor B also has 2 levels, namely animated videos and PowerPoint. The research design is presented in Table 4

Table 4 Research Design of Learning Models and Media on Learning Activities and Outcomes

Learning Model (A)	**Instructional Media (B)**	
	Video (B_1)	**PowerPoint (B_2)**
Discovery Learning (A_1)	A_1B_1	A_1B_2
Guided Inquiry (A_2)	A_2B_1	A_2B_2

Keterangan :

A_1B_1 = Kombinasi perlakuan model *Discovery Learning* dengan media video
A_1B_2 = Kombinasi perlakuan model *Discovery Learning* dengan media powerpoint
A_2B_1 = Kombinasi perlakuan model Inkuiri Terbimbing dengan media video
A_2B_2 = Kombinasi perlakuan model Inkuiri Terbimbing dengan media powerpoint

To make it easier to collect data and analyze data, this research used test and non-test instruments. Test instruments are used to collect data on student learning outcomes, and non-test instruments are used to assess student learning activities during treatment using a combination of various learning models and media.

1. Test Instrument

The instrument used in this research is a test of student learning outcomes in the form of a pre-test and post-test. The form of the test given is an objective test of 40 questions with 5 options (a, b, c, d, e). Before the instrument was used, a trial of the instrument was first carried out at SMA Negeri 17 Medan in class XII MIPA. The instrument analysis carried out to determine the validity, reliability, level of difficulty and

differentiating power of the questions was carried out according to procedures. (Silitonga, 2014).

a. Question Validity Test

To determine the validity of test items, is done by calculating the correlation coefficient between the test item scores and the total score using the product moment formula:

$$r_{xy} = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{\{N \sum X^2 - (\sum X)^2\}\{\{N \sum Y^2 - (\sum Y)^2\}}}$$

Information:

r_{xy} is the test validity coefficient, N is the total number of students, X is the item score and Y is the total item score

To interpret the significance of the question validity price, this price is called the critical price r product moment with $\alpha = 0.05$. If $r_{hit} > r_{table}$ then the question is said to be valid (Silitonga, 2011)

b. Reliability Tes

To determine the reliability coefficient, it can be formulated as follows:

$$r_{11} = \left(\frac{k}{k-1}\right)\left(\frac{S^2 \sum pq}{S^2}\right)$$

The total variance can be found with the formula:

$$S^2 = \frac{\sum X^2 \frac{(\sum X)^2}{N}}{N}$$

$$q = 1 - p$$

Information:

r_{11} is the test reliability coefficient, k is the number of test items, S^2 is score variance, p is The proportion of subjects who answered correctly on each item, q is the Proportion of subjects who answered incorrectly on each item and N is the Total number of students

2. Non-Test Instrument

The non-test instrument used in this research is the observation sheet of student learning activities. Values related to student activities are measured and observed directly by observers who have been previously trained.

The scoring criteria for each indicator are as follows:

3 = Always, if you always act according to the indicators.
2 = Often, if you often do according to the indicators, but sometimes you don't.
1 = Sometimes, if you do it sometimes but don't do it more often.
0 = Never perform according to indicators.

To calculate the value of learning activities, the following equation is used :

$$\text{Value} = \frac{acquisition\ score}{maximum\ score}\ x\ 100$$

Carry out prerequisite tests for statistical analysis, especially normality tests, homogeneity tests, and hypothesis tests. This test aims to see whether the sample is normally distributed or not. This test was carried out using the chi-square test (Silitonga, 2014), If, in the normality test, the data is found to be normally distributed, then a homogeneity test is then carried out, namely testing the equality of the variances of the two samples. Hypothesis testing was carried out using Analysis of Variance (ANOVA) or variance analysis to test whether there was an interaction effect between the learning model and media factors on the observed responses.

▪ RESULT AND DISCUSSION

In this study, a test instrument was used in the form of 40 multiple-choice questions, and a non-test instrument in the form of student activity observation sheets. Before using the test instruments and non-test instruments, they were first validated by expert validators, namely 2 chemistry lecturers, then tested on class XII MIPA 4 students at SMA Negeri 17 Medan, Before the test instruments (pretest and posttest questions) were given to students, validity and reliability tests are carried out. This test aims to determine whether the question is feasible or not to be used when conducting research. The test instrument in this study was tested on students who had studied acid-base material. After obtaining the data from the pretest and posttest results, it was analyzed using Microsoft Excel. After being calculated, the results are obtained as numbers, which will be interpreted according to the criteria. The results of the validity and reliability test of multiple choice can be seen in Table 1.

Table 1. The results of the validity and reliability test of multiple choice

No.	Question Number	Valid	Reliability
1.	1	0,43358868	0,811200072
2.	2	0,44948454	
3.	3	0,604205068	
4.	4	0,554796215	
5.	5	0,388126666	
6.	6	0,506858603	
7.	7	0,34473573	
8.	9	0,506926894	
9.	10	0,395198015	
10.	11	0,433781859	
11.	13	0,397291958	
12.	14	0,459392268	
13.	15	0,368642527	
14.	16	0,500242658	
15.	18	0,392857045	
16.	19	0,604771634	
17.	27	0,395846569	
18.	28	0,434709	

19.	29	0,554796	
20.	31	0,622155	
21.	32	0,3856	
22.	34	0,506983	
23.	37	0,52287	
24.	38	0,466559	
25.	40	0,396201	

- **Learning Outcomes**

Based on the results of post-test data processing (learning outcome scores) of students, a summary of the data is obtained as presented in Table 3 below

Table 2. Average Value of Student Learning Outcomes who were given a combination of Learning Model and Media treatment

	Treatment Combination			
	A_1B_1 (Discovery Learning Model + Video Media)	**A_1B_2 (*Discovery Learning Model* + PowerPoint Media)**	**A_2B_1 (Guided Inquiry Model + Video Media)**	**A_2B_2 (Guided Inquiry Model + PowerPoint Media)**
Average Learning Outcome Value	**70,5 ± 7,62**	**83,5 ± 7,47**	**84,5 ± 7,62**	**58,5 ± 10,29**

Based on the learning outcome value data above, it can be described the differences in student learning outcome scores in experimental class 1, experimental class 2, experimental class 3, and experimental class 4, can be seen in Graph 1 below :

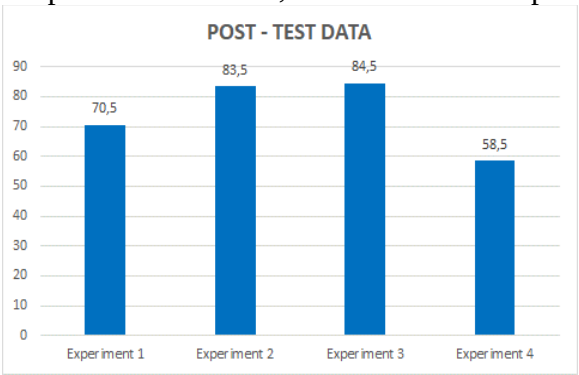

Figure 1. Graph of Student Learning Outcome Values for Each Combination of Learning Model and Media Treatment

1. **Normality Test**

Normality testing of student learning outcomes was carried out using the Chi-Square Test with a significant level ($\alpha = 0.05$). The test criterion is that the data is normally distributed if the calculated chi-square value < the table chi-square value.

Table 3. Normality Test Data

Combination of Treatments	Data Source	X^2 count	X^2 tables	Data Description
A_1B_1	Post Test	10,08	11,07	Normally Distributed
A_1B_2		7,39		Normally Distributed
A_2B_1		10,08		Normally Distributed
A_2B_2		8,57		Normally Distributed

2. Homogeneity Test

In this research, a data homogeneity test was carried out to find out whether the two data coming from different samples were homogeneous. By comparing $F_{count} < F_{table}$ of post-test data and student activities.

Table 4. Calculation Results of the Homogeneity of Variance Test for Two Learning Model Groups

No.	**Learning Model**		**F_{table}**	**F_{count}**	**Data Description**
	Discovery Learning	**Guided Inquiry**			
1.	A_1B_1		3,18	0,961	Homogen
2.	A_1B_2				
3.		A_2B_1	3,18	1,822	Homogen
4.		A_2B_2			

Table 5. Calculation Results of the Homogeneity of Variance Test for Two Learning Media Groups

No.	**Instructional Media**		**F_{table}**	**F_{count}**	**Data Description**
	PowerPoint	**Video**			
1.	A_1B_2		3,18	1,895	Homogen
2.	A_2B_2				
3.		A_1B_1	3,18	1,0	Homogen
4.		A_2B_1			

3. Hypothesis Testing

After conducting normality and homogeneity tests and obtaining results that the samples in this study are normally distributed and homogeneous, hypothesis testing will be carried out using ANOVA. Data analysis of chemistry learning outcomes, especially acid-base, was carried out using two-way ANOVA, the calculation process of which was assisted by Microsoft Excel, which can be seen in Table 6.

Table 6. Summary of Results Analysis Of Variance (ANOVA)

Source of Diversity	Db	JK	KT	F_{count}	F_{table}	
					5%	1%
Treatment	3	4527,5	1509,167	-	-	-
Factor A	1	302,5	302,5	4,356	4,11	7,39
Factor B	1	422,5	422,5	6,084	4,11	7,39

Interaction	1	3802,5	3802,5	54,756	4,11	7,39
Galat / Error	36	2500	69,444	-	-	-
Total	42	11555	-	-	-	-

From the analysis of the variance table it can be seen that F_{count}(A) is 4.356 while Ftable = 4.1; because $F_{count} > F_{table}$ then H_0 is rejected, meaning there is an interaction effect between different learning models and varied media on student learning outcomes in acid-base material in high school. Furthermore, F_{count} (B) was obtained at 6.084 while F_{table} = 4.11 because $F_{count} > F_{table}$ then H_0 was rejected, meaning that different learning models influenced student learning outcomes in acid-base material in high school. Furthermore, F_{count} (AB) was obtained as 54.756, while F_{table} = 4.11; because $F_{count} > F_{table}$, H_0 is rejected, meaning there is a varying influence of media on student learning outcomes in acid-base material in high school. Because the test shows that there is interaction, it is continued with testing the simple influence of the Learning Model factors for level B_1 (YouTube video learning media) and level B_2 (PowerPoint learning media)

After obtaining the ANOVA values, a simple test was carried out on the influence of level B1 learning model factors (video media) and the influence of level B_2 learning model factors (Powerpoint media) on student learning outcomes. The simple influence test of learning model factors at level B_1 (Video Media) with the hypothesis namely:

H_0 = There is no difference between the average learning outcomes of high school students who are given video media and taught with different learning models

H_a = There is a difference between the average learning outcomes of high school students who are given video media and taught with different learning models

Testing the Simple Effect of Learning Model Factors for B_1 Level (Video Media) can be seen in Table 7 below :

Table 7. Testing the Simple Effect of Learning Model Factors for B_1 Level (Video Media)

Diversity Factors	db	JK	KT	F_{count}	$F_{(0,05)}$
Faktor A	1	980	980	16,88	4,41
Galat / Error	18	1045	58,1		
Total	19	3570	-		

From the results of the analysis of variance, the obtained Fcount = 16.88. Meanwhile F_{table} at 5% = 4.41; because $F_{count} > F_{table}$ at the 5% level, then H_0 is rejected, meaning there is a difference between the average learning outcomes of high school students who are given video media and taught with different learning models.

The simple influence test of learning model factors at B_2 level (PowerPoint Media) with the hypothesis namely :

H_0 = There is no difference between the average learning outcomes of high school students who are given PowerPoint media and taught with different learning models

H_a = There is a difference between the average learning outcomes of high school students who are given PowerPoint media and taught with different learning models

Testing the Simple Effect of Learning Model Factors for Level B_2 (PowerPoint Media) can be seen in Table 8 below :

Table 8. Testing the Simple Effect of Learning Model Factors for Level B_2 (PowerPoint Media)

Diversity Factors	Db	JK	KT	F_{count}	$F_{(0,05)}$	$F_{(0,01)}$
Faktor A	1	3125	3125	38,659	4,41	8,28
Galat / Error	18	1455	80,83			
Total	19	4580	-			

From the results of the analysis of variance, it was obtained that F_{count} = 38.659, while F_{table} at 1% = 8.28; because $F_{count} > F_{table}$ at the 1% level, then H_0 is rejected, meaning there is a difference between the average learning outcomes of high school students who are given PowerPoint media and taught with different learning models.

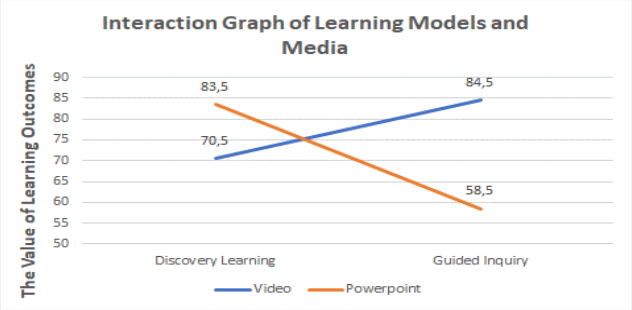

Figure 2. Graph of the interaction of learning models and media on student learning outcomes on acid and base material in high school

From Figure 2, the fact is that teachers who use the Discovery Learning learning model are more suited to using PowerPoint media, this can be seen from the higher average student learning outcomes (83.5 ± 7.47) compared to those using video media (70.5 ± 7.62). On the other hand, in learning acid-base material in high school, if the teacher uses the guided inquiry learning model, it is best to use video media. This can be seen from the fact that by applying this combination of treatments, the average student learning outcome scores are higher (84.5 ± 7 .62) compared to using PowerPoint media (58.5 ± 10.29). The combination of guided inquiry learning model treatment with video media turned out to be the best combination to be used in increasing the value of student learning outcomes compared to the combination of the Discovery Learning learning model with video media and PowerPoint media. This can be seen from the highest average of student learning activities, namely 84.5 ± 7.62.

From the data from this research, it is also proven that in learning acid and base material in high school, if the teacher uses the guided inquiry learning model, it is best not to use PowerPoint media, because this will give a very low average learning outcome value, namely 58.5 ± 10.29

- **Learning Activity**

By using the Student Activity Assessment Guidelines, student activity value data can be presented in Table 9.

Table 9. Average Value of Student Learning Activities who were given a combination of Learning Model and Media treatment

	Treatment Combination			
	A_1B_1 (Discovery Learning Model + Video Media)	**A_1B_2 (Discovery Learning Model + PowerPoint Media)**	**A_2B_1 (Guided Inquiry Model + Video Media)**	**A_2B_2 (Guided Inquiry Model + PowerPoint Media)**
Average Learning Activity Score	**66,85 ± 2,04**	**81,11 ± 8,35**	**80,56 ± 2,51**	**59,26 ± 1,95**

Based on the learning activity data above, it can be described the differences in learning activities in experimental class 1, experimental class 2, experimental class 3, and experimental class 4 through Figure 3.

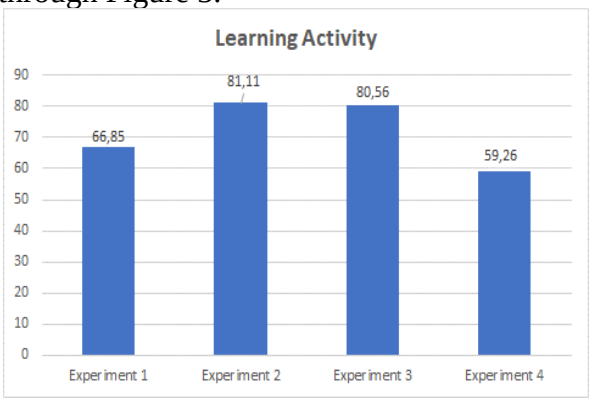

Figure 3. Graph of Student Learning Activity Values for Each Combination of Learning Model and Media Treatment

After conducting normality and homogeneity tests and obtaining results that the samples in this study are normally distributed and homogeneous, hypothesis testing will be carried out using ANOVA. Data analysis of chemistry learning activity, especially acid-base, was carried out using two-way ANOVA, the calculation process of which was assisted by Microsoft Excel, which can be seen in Table 10.

Table 10. List of Analysis of Various Values of Learning Activities in the combination of learning model and learning media treatments

Diversity Source	**Db**	**JK**	**KT**	**Fcount**	**Ftable**	
					5%	**1%**
Treatment	3	3450,071	712,2917	-	-	-
Factor A	1	165,93	165,93	7,904338	4,11	7,39
Factor B	1	123,83	123,83	5,899062	4,11	7,39
Interaction	1	3160,29	3160,29	150,5407	4,11	7,39

Galat / Error	36	755,74	20,99	-	-	-
Total	42		-	-	-	-

From the results of testing the simple influence of learning model factors at level B_1 (Video Media) and level B_2 (Power Point Media) on student activities (Appendix 23), it was obtained that Fcount = 179.87; while Ftable at the 5% level = 4.41. Because $F_{count} > F_{table}$, then H_0 is rejected, meaning there is a real difference in the average learning activities of high school students who are taught with different learning models using video media. Meanwhile, for level B_2 (PowerPoint), Fcount = 64.93; while F_{table} at the 5% level = 4.41. Because $F_{count} > F_{table}$, then H_0 is rejected, meaning there is a real difference in the average learning activities of high school students who are taught with different learning models using PowerPoint media. From the results of the Least Significant Difference (BNT) test, it can be concluded that the learning activities of students who were given a combination of the Discovery Learning Learning Model and PowerPoint Media (A_1B_2) treatment were higher than those treated with the Discovery Learning Learning Model using video media. Furthermore, the learning activity of students who were given a combination of guided inquiry model treatment and video media was higher than those given a combination of guided inquiry model treatment using PowerPoint media. From all the combinations of treatments tried it was concluded that learning by combining the Discovery Learning learning model and PowerPoint media provided the highest average student learning activity, namely 81.11 ± 8.35.

After obtaining the ANOVA values, a simple test was carried out on the influence of level B_1 learning model factors (video media) and the influence of level B_2 learning model factors (Powerpoint media) on student learning activity. The simple influence test of learning model factors at level B_1 (Video Media) with the hypothesis namely:

H_0 = There is no difference between the average learning activities of high school students who are given video media and taught with different learning models

H_a = There is a difference between the average learning activities of high school students who are given video media and taught with different learning models

Testing the Simple Effect of Learning Model Factors for B_1 Level (Video Media) can be seen in Table 11.

Table 11. Testing the Simple Effect of Learning Model Factors for B_1 Level (Video Media)

Diversity Factors	Db	JK	KT	F_{count}	$F_{table(0,05)}$
Factor A	1	938,96	938,96	179,87	4,41
Error / Galat	18	93,96	5,2		
Total	19	3570	-		

From the results of the analysis of variance, obtained Fcount = 179.87. Meanwhile Ftable at 5% = 4.41; because $F_{count} > F_{table}$ at the 5% level, then H_0 is rejected, meaning there is a difference between the average learning activities of high school students who are given video media and taught with different learning models.

The simple influence test of learning model factors at the B_2 level (PowerPoint Media) uses the hypothesis namely:

H_0 = There is no difference between the average learning activities of high school students who are given PowerPoint media and taught with different learning models

H_a = There is a difference between the average learning activities of high school students who are given PowerPoint media and taught with different learning models

Testing the Simple Effect of Learning Model Factors for Level B_2 (PowerPoint Media) can be seen in Table 12.

Table 12. Testing the Simple Effect of Learning Model Factors for Level B_2 (PowerPoint Media)

Diversity Factor	Db	JK	KT	F_{count}	$F_{table\ (0,05)}$	$F_{table\ (0,01)}$
Factor A	1	2387,2744	2387,2744	64,93	4,41	8,28
Error / Galat	18	661,78255	36,8			
Total	19	4580				

From the results of the analysis of variance, it was obtained that F_{count} = 64.93, while F_{table} at 1% = 8.28; because $F_{count} > F_{table}$ at the 1% level, then H_0 is rejected, meaning there is a difference between the average learning activities of high school students who are given PowerPoint media and taught with different learning models.

From the results of the analysis of variance, it has been concluded that there is an interaction between the learning model and the media on student learning activities in acid-base material in high school. The graph of the interaction of learning models and media on student learning activities in this research is presented in Figure 4 below :

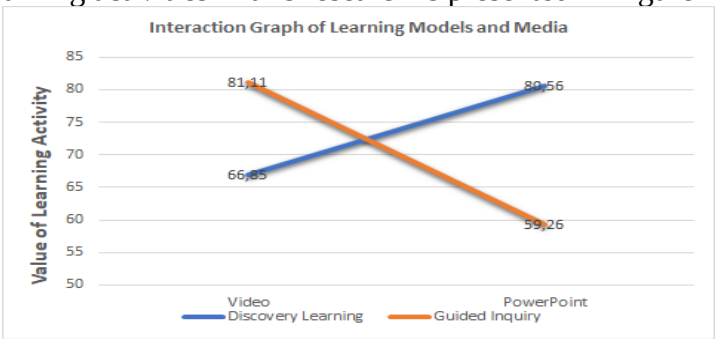

Figure 4. Graph of the Interaction of Learning Models and Media on Student Learning Activities on Acid-Base Material in High School

From Figure 4, it is clear that teachers who use the Discovery Learning learning model are more suited to using PowerPoint media, this can be seen from the higher average student learning activity (80.56 ± 2.51) compared to those using video media (66.85 ± 2 .04). On the other hand, in learning acid and base material in high school, if the teacher uses the guided inquiry learning model, it is best to use video media. This can be seen from the fact that by implementing this combination of treatments, the average

student learning activity score is higher (81.11 ± 8, 35) compared to using PowerPoint media (59.26 ± 1.95). The combination of the guided inquiry learning model treatment with video media turned out to be the best combination to be used for increasing student learning activities compared to the combination of the Discovery Learning learning model with video media and PowerPoint media. This can be seen from the highest average of student learning activities, namely 81.11 ± 8.35. From the data from this research, it is also proven that in learning acid-base material in high school, if the teacher uses the guided inquiry learning model, it is best not to use PowerPoint media, because this will give a shallow average learning activity, namely 59.26 ± 1.95. On the other hand, if the teacher uses the Discovery Learning learning model, it is best not to use video media because this will give a low average learning activity (66.85 ± 2.04).

Based on previous research in chemistry learning, many studies have used the Discovery Learning learning model. Kriani, M, (2022) reported that in the buffer solution material, there was an increase in student activity by 91.57% and the level of student learning completion increased from 42.10% to 84.21%, according to (Fatma et al., 2020) stated that The use of the Discovery Learning learning model provides an increase in student learning outcomes in acid-base material, furthermore (Wulandari & Nasir, 2018) suggests that the use of the Discovery Learning learning model provides an increase in student learning outcomes and activities in the chemical bond material.

The use of the Guided Inquiry learning model on solubility and solubility product material can improve student learning outcomes and improve students' scientific attitudes at SMA Negeri 5 Surakarta (Murningsih, et all. 2016). Furthermore, research conducted by Asni et al., 2020 stated that the guided inquiry model had a better influence compared to conventional ones on student learning outcomes in hydrocarbon material. This is evident from the posttest average for the experimental class (Guided Inquiry) of 75.33 and the control class (conventional) with an average posttest value of 54.1. Research conducted by Oktaviana, et al., 2020 on hydrolysis material stated that the Guided Inquiry learning model was effective in increasing activity (19.36%) and student learning outcomes increased 16%

▪ CONCLUSION

Based on the research results, it can be concluded that there is an interaction between the learning model and the media on student activities and learning outcomes in acid-base material in high school. There is an influence of the learning model on students' activities and learning outcomes in acid-base material in high school. There is an influence of learning media on students' activities and learning outcomes in acid-base material in high school. The activity and learning outcome scores of students who were given a combination of the Discovery Learning Learning Model and PowerPoint media were significantly higher than the activity and learning outcome scores of students who were given a combination of the Discovery Learning Learning Model using video media.

Furthermore, the activity and learning outcomes of students who were given a combination of guided inquiry model treatment and video media were higher compared to the combination of guided inquiry model treatment using PowerPoint media Learning acid and base material in high school which combines the guided inquiry learning model and video media provides the highest average student learning activity, namely 81.11 ± 8.35, and provides the best average learning outcome value, namely 84.5 ± 7, 62.

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