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Effectiveness of Interactive Power-Point Learning Media Based on Guided Inquiry on Acid-Base Materials for Class XI SMA/MA

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Abstract: The effectiveness of guided inquiry-based interactive power-point learning media on acid-base material for class XISMA/MA. This study aims to analyze the effectiveness of interactive power-point learning media based on guided inquiry on the acid-based topic on student learning outcomes at SMA Adabiah 2 Padang.This quasi-experimental study used anonequivalent control-group design.The population consists of gradeXIstudent ofAdabiah 2 High School Padangin the 2021/2022 school year and samples were taken using purposive sampling technique. The research instrument was a multiple-choice test and the data were analyzed by n-gain test, normality test, homogeneity test and hypothesis testing by t-test.Based on data analysis, the experimental class n-gain was significantly higher than the control class with the medium category. To test the hypothesis obtained sig (2-tailed) < 0.05 so that it indicates the hypothesis is accepted. It can be concluded that the use of interactive power-point learning media based on guided inquiry on acid-base material is effective in improving student learning outcomes at SMA Adabiah 2 Padang. Therefore, guided inquiry-based interactive power-point learning media on acid-base topic can be used for learning chemistry in the classroom.

Keyword: Power-Point, Guided Inquiry, Acid-Base

Abstrak: Efektivitas media pembelajaran power-point interaktif berbasis inkuiri terbimbing pada materi asam basa kelas XI SMA/MA. *Penelitian ini bertujuan untuk mengetahui tingkat efektivitas media pembelajaran power-point interaktif berbasis inkuiri terbimbing pada materi asam basa terhadap hasil belajar peserta didik di SMA Adabiah 2 Padang. Penelitian eksperimen semu ini menggunakan desain penelitian nonequivalent control-group design. Populasi terdiri dari peserta didik kelas XI SMA Adabiah 2 Padang tahun ajaran 2021/2022, pemilihan sampel menggunakan teknik purposive sampling dan terpilih kelas XI MIPA 1 sebagai kelas eskperimen dan XI MIPA 3 sebagai kelas kontrol. Instrumen penelitian berupa tes dalam bentuk soal pilihan ganda serta data di analisis menggunakan uji N-Gain, uji normalitas, uji homogenitas dan uji hipotesis menggunakan uji t. Berdasarkan analisis data, diperoleh N-Gain kelas eksperimen lebih tinggi secara signifikan dibandingkan kelas kontrol dengan kategori sedang. Untuk uji hipotesis yang diperoleh sig (2-tailed) < 0,05 sehingga menunjukkan hipotesis diterima. Dapat disimpulkan bahwa penggunaan media pembelajaran power-point interaktif berbasis inkuiri terbimbing pada materi asam basa efektif dalam meningkatkan hasil belajar peserta didik di SMA Adabiah 2 Padang. Oleh karena itu, media pembelajaran power-point interaktif berbasis inkuiri terbimbing pada materi asam basa dapat digunakan untuk pembelajaran kimia di kelas.*

KataKey: *Power-Point,*Guided Inquiry, Acid-Base

- **INTRODUCTION**

One part of natural science (IPA) is chemistry which studies the composition, composition and properties as well as changes in matter and the accompanying energy changes (Brady, 2012). Sour Base is a chemical material in which there are facts, concepts, principles and procedures. Characteristics of acid-base materials are factual and abstract. Material that is factual can be seen through direct experimental methods in the learning process such as changing the color of red litmus to blue when red litmus is put into a solution of NaOH in water. While the abstract material can be seen in the submicroscopic part that cannot be observed directly, such as the ionization process of solid NaOH in water.

At the high school level, the learning process using the 2013 curriculum is applied a scientific approach. The scientific approach is a student-centered learning approach. Scientific learning does not only view learning outcomes as the final process, but the learning process is very important (Abidin, 2014). To increase the activeness of students in the learning process, it is not only determined by a good teacher or the curriculum used, but is determined by the learning model used by the teacher (Winda, 2014). One of the learning models that apply a scientific approach according to the demands of the 2013 curriculum is a guided inquiry-based learning model (Fauziah, 2013). Guided inquiry is a student-centered learning model (Rahman, 2018). In applying the guided inquiry model, the teacher is not only a source of learning but has a role as a facilitator and motivator. Guided inquiry provides opportunities for students to be able to develop their abilities think critically, systematically and logically by the way the teacher asks students to investigate the learning model and is directed to answer key questions. So that students can conclude their own findings (Dwi, 2010).

Based on observations and interviews that have been conducted with teachers and several students at SMA Adabiah 2 Padang, it is known that 1) the method used in the acid-base material is lectures and discussions, in the method used there are obstacles such as the inactivity of students in discussions and the amount of time spent needed for discussion. As for the demonstration method, there are some teachers who apply the method and some do not. Because the teaching and learning process uses a blended learning system so that not all students can do practicum and there are limited time and insufficient tools and materials. 2) teaching materials used in the learning process in the form of LKPD, modules, power-points, printed books and LKS. The teaching materials used are quite helpful in learning but do not contain all existing representative levels. At the submicroscopic representative level, it is only explained orally (lectures) so that it is difficult to understand and cannot be displayed so that chemistry learning is considered abstract (cannot be seen). 3) acid-base material is a material that is considered difficult by students, this is evidenced by the daily average value of students on acid-base material which is still below the KKM.

The solution is that we need a learning media that can direct students in finding concepts in acid-base material. Therefore, it takes a learning media that is in accordance with the characteristics of the chemical material. The type of learning media that can be used to display chemical phenomena in representative macroscopic, submicroscopic and symbolic levels, one of which is interactive power-point media based on guided inquiry. This interactive power-point learning media is designed in such a way that it can guide students to be able to find concepts independently through the questions on the slides. In addition, this media can also assist students in seeing facts through the form of models in the form of practicum videos and animations displayed on slides.

Other research shows that interactive learning media with power-point slides can be used to increase students' motivation and activeness in learning as well as student achievement (Yuliasah, 2018). In addition, the use of power-points in the learning process can increase students' motivation and learning outcomes (Srimaya, 2017). Other research also supports this,

namely by (Aina, 2013). The results of several studies show that the use of learning media in which there is a level of chemical representation will form a mental model as a form of approach to real life from the outside (Sunyono, 2015).

This guided inquiry-based interactive power-point learning media is available which has been developed by Romy Chania (2021) and has been tested for validity and practicality. However, the level of effectiveness of the guided inquiry-based interactive power-point learning media on acid-base material has not been tested. Based on the description above, this study aims to determine the level of effectiveness of guided inquiry-based interactive power-point learning media on acid-base material on the learning outcomes of students in class XI SMA Adabiah 2 Padang.

- **METHOD**

This type of research is a quasi-experimental research (quasi-e-experimental research). The model used in this study is a nonequivalent control-group design using two sample classes, namely the experimental class and the control class. The sampling technique used purposive sampling technique.

Daltal Analysis Techniques

The data from the research results can be tested using data analysis techniques, namely the two-mean difference test or t-test. Before performing the t-test, first perform the N-Gain test, homogeneity test and normality test.

a. Normalized Gain Test (N-Gain)

N-Gain test aims to determine the increase that occurs before and after learning. Here are the steps in calculating N-Gain:

1. The students' pretest and posttest scores are determined by the formula:

$$= \frac{\sum the\ answer\ score\ obtained}{score\ max}\ x\ 100\%$$

Student Score

2. After the student scores are obtained, the N-Gain calculation is carried out. Use a formula like:

$$= \frac{score\ \ posttest - score\ pretest}{skor\ \max - skor\ pretest}$$

N-Gain or Gain Score

3. Then calculate the average value of N-Gain with the formula:

$$= \frac{\sum student\ N-Gain}{total\ student}$$

Average N-Gain

4. The results of the N-Gain calculation are then interpreted using the classification as shown in Table 1.

Table 1. N-Gain Classification

N-Gain	Criteria
g 0.7	Tall

0.7 > g > 0.3	Currently
g 0.3	low

b. **Normality test**

Normality test is used to determine whether the data is normally distributed or not. In the normality test, using the SPSS application with the test *Shapiro-Wilk*. The stages in testing normality through the SPSS application, namely:

1.Enter the research data on the SPSS worksheet
2.Click the analyze menu and select descriptive statistics and explore
3.Enter the dependent variable in the dependent list and the independent variable in the factor list
4.Then click plots and activate normality plots with test and click continue.

The following are the normality test criteria at a significance level of 0.05 in Table 2 (Santoso, 2016).

Table 2. Normality Test Criteria

Significance Value (sig)	Criteria
(sig) > 0.05	Normal distributed data
(sig) < 0.05	Data is not normally distributed

c. **Homogeneity test**

The homogeneity test aims to determine whether two groups of data already have homogeneous variants or not. Homogeneity test can be done using *test of homogeneity of variance*. The stages of homogeneity testing through the SPSS application, namely:

1. Enter the research data on the SPSS worksheet
2. Click the compare means menu
3. Choose One way Anova
4. Enter the dependent variable in the dependent list and the independent variable in the factor list
5. Click options, then activate the test of homogeneity of variance
6. Then click continue.

The following are the homogeneity test criteria at a significance level of 0.05 in Table 3 (Santoso, 2016).

Table 3. Homogeneity Test Criteria

Significance Value (sig)	Criteria
sig value > 0.05	Data has homogeneous variance
sig value < 0.05	The data has non-homogeneous variance

d. **Hypothesis testing**

Hypothesis testing aims to determine whether the hypothesis of the study can be accepted or rejected. Hypothesis testing was carried out after the normality test and homogeneity test were carried out. The hypothesis test was carried out to determine the learning outcomes of the

control class and experimental class using the t-test or *independent sample t-test.*

The following are the stages of hypothesis testing using the t-test, namely:
1.Enter the research data on the SPSS worksheet
2.Click the compare mean menu and select independent sample t-test
3.Enter the dependent variable in the test variable section and the independent variable in the grouping variable section.

The following are the criteria for testing the hypothesis at a significance level of 0.05 in Table 4 (Santoso, 2016).

Table 4. Hypothesis Test Criteria

Significance Value (sig)	Criteria
(sig 2-tailed) > 0.05	H0 accepted
(sig 2-tailed) < 0.05	H0 rejected

H_0: 1 2
H_1: 1 > 2

Information:

H0 : The learning outcomes of students in a class that uses interactive power-points based on guided inquiry (experiments) are the same as those in classes that do not use interactive power-points based on guided inquiry (controls).

H_1 : The learning outcomes of students in the class that used interactive power-points based on guided inquiry (experiments) were higher than those in the classes that did not use interactive power-points based on guided inquiry (controls).

μ_1 : Experimental class n-gain value

μ_2 : Control class n-gain value

- **RESULT AND DISCUSSION**

a. Sample Class Pretest and Posttest Data

Table 5. Sample Class Pretest Data

Sample Class Pretest Score			
Number	**Score**	**Frequency**	
		Experiment	**Control**
1	32	5	2
2	36	4	5
3	40	4	2
4	44	5	4
5	48	3	5
6	52	4	6
7	56	3	4
8	60	1	1
9	64	0	0
10	68	0	0
	Amount	1,264	1.336
	Average	43.58	46.06

Table 6. Sample Class Posttest Data

Sample Class Posttest Score			
Number	**Score**	**Frequency**	
		Experiment	**Control**
1	60	0	2
2	64	1	2
3	68	3	7
4	72	4	9
5	76	7	6
6	80	8	2
7	84	4	1
8	88	2	0
	Amount	2.240	2.072
	Average	77.24	71.44

b. Sample Class N-Gain Average

Table 7. Sample Class N-Gain Average Value

Class	**N**	**Average**		
		Pretest	**Posttest**	**N-Gain**
Experiment	29	43.58	77.24	0.58
Control	29	46.06	71.44	0.45

Table 8. Sample Class Normality test results

Class	**Significance level**	**N**	**(sig)**	**Decision**
Experiment	0.05	29	0.200	Normal distribution
Control		29	0.100	

c. Sample Class Homogeneity Test Results

Table 9. Sample Class Homogeneity Test Results

Class	**Significance level**	**(sig)**	**Decision**
Experiment Control	0.05	0.418	homogeneous variance

***e.* Sample Class Hypothesis Test Results**

Table 10. Sample Class Hypothesis Test Results

Class	**(sig)**	**Decision**
Experiment Control	0.000393	H_0 rejected H_1 accepted

The effectiveness of learning media can be seen from the increase in student learning outcomes before and after using learning media. Pretest (initial test) is carried out to determine the initial abilities possessed by students (Azizah Kristalia, 2021). The initial knowledge of students is very important in the implementation of the learning process. Posttest (final test) is carried out to determine the students' mastery of the subject matter that has been taught (Azizah Kristalia, 2021).

The data analysis in Table 5 and Table 6 that has been carried out shows the fact that student learning outcomes have increased in the sample class. For the average pretest value of the experimental class is 43.58, the mean value of the control class is 46.06. Meanwhile, the posttest average value for the experimental class was 77.24, the posttest average value for the control class was 71.44. The difference between the pretest and posttest scores of the experimental class was 33.66.

A learning media can be known the level of effectiveness from the N-gain equation through the results of the pretest and posttest obtained by students. Based on Table 7 the average N-Gain value of the experimental class is 0.58. While the average value of the control class is 0.45. The average value of the two sample classes is in the medium category, but the experimental class has a higher N-Gain score than the control class with a difference of 0.13. This shows that guided inquiry-based interactive power-point learning media on acid-base material is more effective in improving student learning outcomes (Yuliansah, 2018). After obtaining the N-Gain value from the two sample classes, the normality test and homogeneity test were carried out. Normal data and have homogeneous variance, hypothesis testing will be carried out using the t-test (independent sample t-test). In Table 10, the sig (2-tailed) value obtained is 0.000393. It means that H0 is rejected, H1 is accepted. So that there is a significant increase in learning outcomes in the experimental class compared to the control class.

Other research reveals that the use of animation-based power-point learning media can increase students' learning motivation and learning outcomes (Yuliansah, 2018). The use of power-points in the learning process can increase student learning motivation so that student learning outcomes also increase (Srimaya, 2017). In addition, learning using the guided inquiry model affects the understanding of concepts and the discovery of students' concepts (R. Diyah Puspitasari, 2019). Learning using the guided inquiry model is also effective in improving classifying and communicating skills (Galih Wahyu Pratama, 2015). Learning material developed with a colorful display, there are interesting animations,

Chemistry interactive power-point learning media provides opportunities for students to be able to learn according to their respective abilities and speed (Harliana, 2018). Technology-based learning media is also useful for generating motivation and interest in learning for students (Adam, 2015). Good learning media is defined as learning media that has ease of use (Arsyad, 2013). Interactive learning media has advantages and disadvantages. The advantage of multimedia is that it can be operated directly without having to install software first (Nazalin, 2016). The advantage of interactive multimedia is that there are instructions for use and procedures for use for users who will use the media, so that users do not experience difficulties in operating (Fanny, 2013).

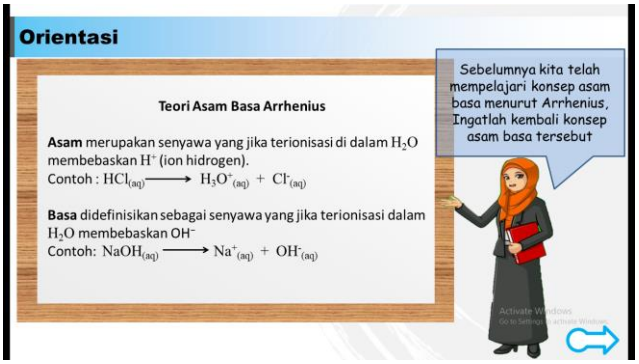
In addition, the guided inquiry-based interactive power-point learning media before being used for the learning process in the classroom has been improved. In the guided inquiry-based interactive power-point learning media there are learning syntaxes such as:

Orientation

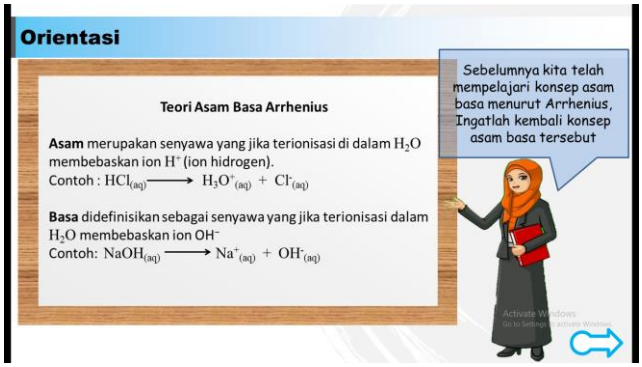
The orientation stage includes the preparation of students in chemistry learning where the teacher provides motivation, conveys learning objectives, links the material to be studied with the knowledge possessed by students so as to produce curiosity with the material to be

studied.

Before repair:



After repair:



Concept Exploration and Formation

At this stage, an experimental video is shown which is equipped with animation. Then students are asked to investigate the model and are directed to answer key questions. If students answer correctly, then the next question will appear. However, if the student's answer is wrong, they will be redirected back to watch the video.

Before repair:

After repair:

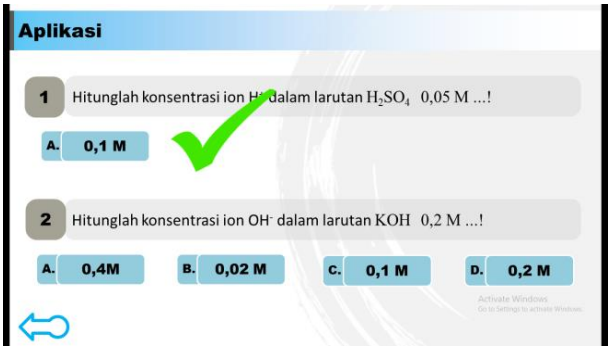
Application

At the stage of application of students' knowledge of the concepts that have been

obtained at the stage of exploration and understanding of the concept, it is proven by providing questions that students must answer in the given exercise.

Before repair:

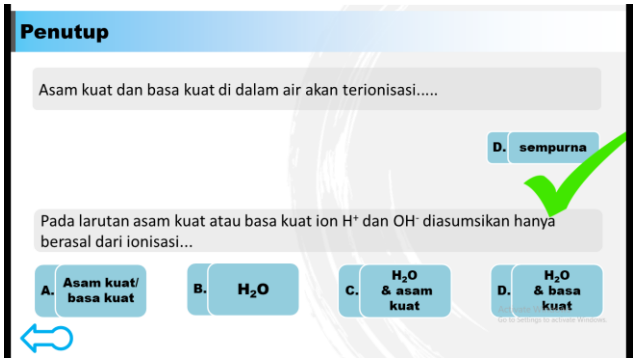
After repair:



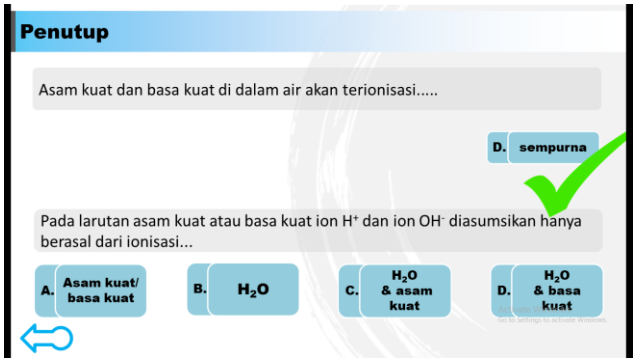
Closing

At this stage, students are asked to conclude by answering questions. Students are stated to understand and understand the material, if the process of exploration, concept formation and application given is passed.

Before repair:



After repair:



Acid-base materials can be studied in the classroom and in the laboratory. However, learning using guided inquiry-based interactive power-point learning media that includes

activities in the classroom and in the laboratory can be carried out only in class. Because the power-point learning media has contained experimental videos and there are animations that can display the actual process. In addition, interactive learning media can help with time constraints and can make time more effective. Complex chemistry learning materials can be learned easily through interactive media that contains models in the form of images, animations and sounds (Soojung Kim, 2016).

Based on the above discussion, it can be concluded that the use of interactive power-point learning media based on guided inquiry on acid-base material is effective in improving student learning outcomes in class XI SMA Adabiah 2 Padang.

• CONCLUSION

Based on the results of the study, it can be concluded that the use of interactive power-point learning media based on guided inquiry on acid-base material is effective in improving student learning outcomes at SMA Adabiah 2 Padang with an average N-Gain value of 0.58 in the medium category.

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