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The Effect of Videoscribe Media Assisted by the Guided Inquiry Learning Model on Students' Physics Learning Outcomes

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ABSTRACT

This research is motivated by the low learning outcomes in physics among students, which are influenced by the teacher-centered learning model and the limited use of innovative learning media. The aim of this study is to determine the effect of the guided inquiry model assisted by Videoscribe media on students' physics learning outcomes. This research employed a quantitative approach with a quasi-experimental design involving two classes: an experimental class (XI Science 1) that used Videoscribe media within the guided inquiry model, and a control class (XI Science 2) that used the guided inquiry model without media assistance. The experimental and control classes consisted of 23 and 26 students, respectively. The instrument used in this study was a learning outcome test in the form of a pre-test and post-test. The average pre-test score in the experimental class was 39.13, which increased to 78.26 after treatment. In the control class, the average pre-test score was 34.61, increasing to 66.53 after treatment. Data analysis involved normality testing, homogeneity testing, and hypothesis testing, which showed a significant improvement in the learning outcomes of students in the experimental class compared to the control class. The results indicate that the guided inquiry learning model assisted by Videoscribe media has a positive effect on students' physics learning outcomes on the topic of heat.

1. INTRODUCTION

Physics is a branch of natural science that relates to the study of natural phenomena that can be observed and tested systematically. Thus, physics is not only about a collection of knowledge such as facts, concepts, or principles, but also involves a process of discovery. Based on the expected conditions, the physics learning process should be able to encourage students to enjoy and actively engage in discovering knowledge and gaining a deep understanding of physics material (Hajratun et al., 2022).

In reality, physics is one of the subjects considered difficult and is often avoided by some students because it requires diligence, seriousness, and frequent practice. Students' low interest in learning physics results in reluctance to complete assignments, a lack of interest in reading books or materials related to physics, and even happiness when physics classes are canceled due to the

teacher's absence. As a consequence, the quality of education declines due to low student achievement (Liza, 2021).

One way to observe the success of students' learning processes at school is through the learning outcomes achieved (Nurfarida, 2019). Learning outcomes are defined as the level of success students attain in mastering subject matter at school, expressed in scores obtained from tests on specific material (Purwaningsih, 2022).

Based on an interview conducted by the researcher with a physics teacher at SMA Negeri 5 Banda Aceh, it was revealed that physics learning activities have so far been teacher-centered. As a result, the learning outcomes do not meet expectations. Based on a test involving 35 students, only 4 students passed, while 31 students did not, meaning that only about 11% achieved the minimum passing score.

One learning model that can actively engage students and aligns with the nature of physics, consisting of both processes and products is the guided inquiry model (Nurfarida, 2019). The guided inquiry model can improve students' learning outcomes because students discover learning concepts themselves through direct experience (Sarumaha, 2022). This model is carefully planned, highly controlled, and instructional in nature, with the teacher guiding students through in-depth material (Sarumaha, 2020).

Astiti et al. (2021) stated that one external factor affecting students' learning outcomes is the use of learning media. One example of technology-based learning media is Videoscribe (Basri, 2019). Videoscribe is a type of video media using a whiteboard concept, where a hand appears to draw or write as if on a board (Ariyati, 2021). Videoscribe is easy to use and can be independently developed, allowing educators to creatively present ideas suitable for the learning process without needing special skills (Listari, 2023). By combining the guided inquiry model with virtual experiments, it is expected that students can gain meaningful and interactive learning experiences. Therefore, this study aims to determine the extent to which the learning model affects students' science process skills and learning outcomes.

2. METHODS

This study is a quasi-experimental research using a Pretest-Posttest Control Group design with a quantitative approach. The research subjects were eleventh-grade students at SMA Negeri 5 Banda Aceh. Class XI-A was designated as the experimental group, which used the Guided Inquiry model assisted by Videoscribe media, while Class XI-2 used the Guided Inquiry model without media assistance. The design of this study can be illustrated as follows:

Tabel 1. Pretest-Posttest Control Group Assessment Results

class	initial test	treatment	final test
experiment	O_1	X_1	O_2
control	O_3	X_2	O_4

Explanation:
O1 & O3 = Pretest Scores
O2 & O4 = Posttest Scores
X1 = Treatment applied (Guided Inquiry Model assisted by Videoscribe)
X2 = Treatment applied (Guided Inquiry Model)

The research instruments consisted of: (1) an observation sheet on the implementation of the guided inquiry learning model assisted by Videoscribe media, (2) a student response questionnaire, and (3) multiple-choice tests to measure students' learning outcomes. Data analysis was conducted using the N-Gain test, normality test, homogeneity test, difference test using the t-test, and calculation of the effect size using Cohen's d formula to determine the essential impact of the treatment applied. The results of the observation sheet on the implementation of the model were analyzed using the following equation (Ministry of National Education, 2003):

$$\text{Average Percentage Score (APS)} = \frac{\text{Score Obtained}}{\text{Maximum Score}} \text{ x } 100\% \quad (1)$$

Based on the formula above, the percentage score is obtained by comparing the score achieved with the maximum score. The maximum score is calculated by multiplying the maximum score per item by the number of items assessed, then multiplying by 100%. The criteria are determined based on Table 2 below.

Tabel 2. Interpretation Scale for the Implementation Criteria of the Learning Model

number	assessment score	category
1	90% ≤ NR ≤ 100%	very good
2	90% ≤ NR < 80%	good
3	80% ≤ NR < 70%	fair
4	70% ≤ NR < 60%	poor
5	0% ≤ NR < 60%	very poor

Source: Ministry of National Education (2003)

The results of the student response questionnaire observations were analyzed using the following Equation 2:

$$P = \frac{S}{N} \text{ x } 100\% \quad (2)$$

Explanation:
P = Percentage score (%)
S = Total score obtained
N = Maximum possible score

Tabel 3. Student Response Questionnaire Categories

score interval	explanation
0-20	very poor
21-40	poor
41-60	fair
61-80	good
81-100	very good

Source: Kartini and Nyoman (2020)

The data analyzed at this stage includes the results of the pretest and posttest. The N-Gain test is a commonly used method to evaluate the effectiveness of a learning model or intervention in improving students' learning achievement (Sukarelawa et al., 2024). The equation used is as follows:

$$\text{N-Gain} = \frac{skor\ posttest - skor\ pretest}{skor\ ideal - skor\ pretest} \quad (3)$$

Tabel 4. Student Response Questionnaire Categories

N-Gain scrore	interpretation
g > 0,7	high
0,3 ≤ g ≤ 0,7	medium
g < 0,3	low

Source: Hake (1998)

For the purposes of quantitative analysis, learning outcome data are converted into percentages. This is done to transform categorical numerical/discrete data into continuous quantitative data. If the data are normally distributed and homogeneous, the analysis is conducted using the t-test with the following formula:

$$T_{hitung} = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\frac{(n_1-1)s_1{}^2+(n_2-1)s_2{}^2}{n_1+n_2-2}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}} \quad (4)$$

Explanation:
x_1 = Mean score of the guided inquiry treatment group
x_2 = Mean score of the inquiry treatment group
N_1 = Number of samples in the guided inquiry treatment group
N_2 = Number of samples in the inquiry treatment group
S_1 = Variance of the guided inquiry treatment group
S_2 = Variance of the inquiry treatment group

To determine whether the treatment has a meaningful/significant impact, a further test is conducted. This analysis uses the Effect Size test. The Effect Size used is Cohen's d, which not only indicates statistically significant differences but also provides information about the practical significance of a treatment. Therefore, Cohen's d is important as a complement to the significance test, as it helps researchers understand whether a statistically significant result also has practical relevance in the learning context (Lakens, 2013; Gravetter and Wallnau, 2016). The Cohen's d test uses the following equation (Cohen, 1988):

$$\text{Cohen's d} = \frac{M_1 - M_2}{Pooled\ Sd} \quad (5)$$

$$\text{Pooled Sd} = \sqrt{\frac{(n_1-1)(s_1)^2+(n_2-1)(s_2)^2}{n_1+n_2-2}} \quad (6)$$

Explanation:
M_1 and M_2 = mean scores of science process skills (SPS) from each group
n_1 and n_2 = total sample from each group
$s_1{}^2$ and $s_2{}^2$ = variance of each group
SDpooled = pooled standard deviation of both groups

Tabel 5. Cohen's d Standard Interpretation

score d	effect size category	practical meaning
< 0,20	very small	Almost no difference, not practically meaningful
0,20–0,49	small	There is an effect, but it is not essentially significant
0,50–0,79	medium	The effect is reasonably meaningful and worth considering
≥ 0,80	large	Strong and practically/essentially meaningful effect

Source: Cohen (1988)

3. RESULT AND DISCUSSION

Based on the average percentage of N-Gain scores, qualitatively, the improvement in learning outcomes from both the Guided Inquiry class assisted by Videoscribe media and the standard Guided Inquiry class falls into the medium category. However, the difference in the average N-Gain between the two classes is 16.20%.

The core of this research lies in comparing two learning models. The significant difference in learning outcomes based on the average N-Gain score cannot yet be interpreted or concluded as a direct effect of the treatment. This is based on the consideration that a statistically significant mean difference does not always imply a practically important effect or impact (Lakens, 2013). In addition, qualitative analysis also showed that the average improvement in learning outcomes from both treatment groups was not notably different. To determine the extent to which the average N-Gain

difference can be interpreted as a practically meaningful effect, further analysis is needed, specifically the effect size test. One such test is Cohen's d, which is widely used to measure the magnitude of the effect in comparative studies between groups (Sullivan & Feinn, 2012).

The result of the Cohen's d test in this study yielded a value of d = 0.731. This index falls into the medium effect size category, as it lies within the range of 0.5 < d < 0.8 (Cohen, 1988). This effect size indicates that the Guided Inquiry learning model assisted by Videoscribe media has a reasonably meaningful practical impact on students' learning outcomes. In the context of this study, the improvement in students' learning outcomes is partially influenced by the media used in the learning process. An appropriate medium, such as Videoscribe, can facilitate students' understanding of complex subject matter. The significant improvement observed in the experimental class demonstrates that the use of Videoscribe media as a supporting tool within the guided inquiry model not only made the material easier for students to understand but also increased their engagement in the learning process.

Thus, the Cohen's d value of 0.731 obtained in this study reinforces the argument that the Guided Inquiry model is worth recommending as an effective learning alternative, particularly for students who are relatively less independent. This approach not only enhances students' conceptual understanding but also supports the achievement of other learning indicators more evenly.

4. CONCLUSION

Based on the analysis results, it can be concluded that the average improvement in learning outcomes (N-Gain) in the Guided Inquiry class assisted by Videoscribe media is higher than that in the standard Guided Inquiry class. The t-test results indicate a significant difference. Furthermore, the follow-up analysis using effect size shows a medium category effect of the Guided Inquiry learning model assisted by Videoscribe media on students' physics learning outcomes.

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