

Comparative Effectiveness of Video and Picture Media on Students' Biology Learning Outcomes

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Abstract: Learning media play a crucial and inseparable role in the teaching and learning process. Appropriate learning methods and media, such as videos and images, are necessary to facilitate students' understanding of the material presented by the teacher, ultimately maximizing learning outcomes. This study aims to determine the differences in biology learning outcomes using video media and images in Class VII of SMPN 1 Gunungsari. This type of research is a quasi-experimental study. The population of this study consisted of all students in class VII, comprising 10 classes with a total of 340 students. This study employed two classes: the experimental class and the control class. This study employed a purposive sampling technique, where the sample consisted of students who were more active and had stable learning outcomes. The experimental class consisted of 33 students, and the control class consisted of 33 students, resulting in a total sample of 66 students. The experimental class received learning through video media, while the control class used images. The results of this study showed that the average post-test score of the experimental class was 92.09, and the average post-test score of the control class was 80.06. Thus, the learning outcomes of students taught with video media were better than images. The results of the independent sample t-test showed a significant (2-tailed) value of 0.000 ($p < 0.05$), indicating a difference in biology learning outcomes between video media and images in class VII students of SMPN 1 Gunungsari.

Keywords: Effective; Images; Learning Outcomes; Motivation; Video.

Introduction

Education is a deliberate and organized attempt to make learning fun for pupils. Students' potential can be developed through this learning [1]. Learning is the process of instruction and learning activities that occur between students and teachers, along with all the tools that support them. The quality of learning is said to be good if the learning process is centred on student activities (student-centred learning) and not centred on the teacher (teacher-centered learning). In school education, teachers play a very active role in helping students achieve satisfactory and optimal learning outcomes. Learning media and instructional strategies are two crucial components of the teaching and learning process. These two elements are connected. Although there are still a number of other factors to take into account when choosing learning media, such as learning objectives and the anticipated responses of students following the teaching process, as well as the learning context, including student characteristics, the choice of a specific teaching method will influence the type of learning media that is appropriate [2]. Alternatives that teachers can use to achieve learning objectives include choosing learning methods using appropriate learning media, both material and so that learning objectives can be achieved optimally [3].

The teaching and learning process cannot be separated from the importance of learning media. Learning media encompasses all tools, teaching materials, demonstrations, and school facilities and infrastructure used

in the learning process [4]. Advances in science and technology have a significant impact on the development of learning media, particularly in the field of biology. Direct and meaningful learning experiences are offered by biology classes to help students improve their skills and gain a deeper comprehension of the natural world [5]. Science learning, particularly biology, is a form of learning that explores living things and their components [6]. Science learning is expected to connect the knowledge gained by students to their lives and the problems they face. The goal is to create students who can think and behave scientifically [7].

Based on observations and interviews with a seventh-grade science teacher at SMPN 1 Gunungsari, the teacher rarely utilises learning media, such as PowerPoint presentations, images, videos, and other diverse learning materials, during the learning process. Students are taught using lectures or conventional methods, and assignments, which naturally prevent them from fully absorbing the material and concepts. This should be obtained through other sources and supporting learning media. This type of learning is considered ineffective because it doesn't consider students' understanding and motivation to learn the material being presented. The lack of direct and active student participation results in a boring classroom, which, in turn, lowers student motivation and consequently reduces student learning outcomes.

Therefore, in Biology, appropriate learning methods and media, such as video and image media, are required to facilitate student understanding of the material presented by

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the teacher, ultimately maximizing learning outcomes. Using video media allows teachers to be creative in creating an engaging learning process, as it is accompanied by video displays that are easier for students to understand [8]. Meanwhile, the use of image media in learning can create a fun and active learning atmosphere [9]. Image media can strengthen memory and clarify the relationship between learning material and everyday life [10]. Learning outcomes serve as a measuring tool to determine the extent to which students have mastered the subject matter presented by the teacher. Good learning refers not only to student learning success in terms of numbers but also to the success of the learning process itself [11].

Several previous studies conducted by a number of researchers reported that the use of video media as a solution to improve science learning outcomes [12], [13]. The results of previous research conducted by [14] reported that the use of image media can improve biology learning outcomes as indicated by the average test and completion rates in each cycle. In line with the results of research conducted by [15] reported that the use of image media can improve science learning outcomes. Based on the description above, researchers need to conduct research by comparing the two media with the title "Comparison of Biology Learning Outcomes Using Video Media and Images in Grade VII of SMPN 1 Gunungsari".

Research Methods

Research Design

This research was quasi-experimental. The experimental variables and conditions could not be fully controlled in this study. A quasi-experimental approach was used because it was difficult to obtain a control group for the study [16].

Population and sample

The population in this study consisted of all seventh-grade students at SMPN 1 Gunungsari, comprising 10 classes with a total of 340 students. The sample in this study was drawn using a purposive sampling technique. The sample consisted of 66 students from classes VII-A and VII-B, with each class comprising 33 students. The independent variable in this study was the use of video and image media, while the dependent variable was students' cognitive learning outcomes in biology learning.

Data collection

The data collection technique used in this study was a test structured as a multiple-choice objective test with 25 questions to measure cognitive domains. During the learning process, the researcher administered a pretest and a posttest.

Data analysis

The normality test for this study was conducted using IBM SPSS Statistics 25, adhering to the Kolmogorov-Smirnov method. The significance level used as a rule to accept or reject the normality test for a data distribution was

$\alpha = 0.05$. If the significance value obtained is greater than α (0.05), the distribution is considered normal. Conversely, if the sig or significance value obtained is $< \alpha$ (0.05), the distribution is not normal [17].

The homogeneity test in this study was analyzed using the Levene test using IBM SPSS Statistics 25. If the Levene's statistic value is greater than 0.05, the data variation can be considered homogeneous. If the Levene statistic value is < 0.05 , the data variation can be considered heterogeneous [16]. This study employs two independent samples, allowing for the use of the Independent sample t-test with the aid of IBM SPSS Statistics 25, provided that the data are normally distributed and homogeneous.

Results and Discussion

The validation results were obtained from four expert validators, including three lecturers and one science subject teacher. The results of the media expert validation obtained a percentage of 80% categorized as valid, which shows that the media used is in accordance with the aspects of material, illustration, quality and appeal of the media, while for the validation of test questions obtained a percentage of 78% categorized as valid, which shows that the questions are in accordance with the question indicators, use language that is easy to understand and does not cause double interpretation.

Learning Results Using Video

Before the learning was implemented, a pre-test was carried out, yielding an average value of 56.24. After learning from videos, a post-test was conducted, yielding an average value of 92.06.

Table 1. Video Media Learning Outcomes Data

	N	Lowest Value	The highest score	Average
Pre-test	33	40	76	56.24
Post-test	33	84	100	92.06
N-gain				0.82

Learning Results using Pictures

Before the learning was implemented, a pre-test was carried out, and the average value was 45.45. After learning from videos, a post-test was conducted, and the average value was 80.06.

Table 2. Data on Learning Outcomes Using Image Media

	N	Lowest Value	The highest score	Average
Pre-test	33	30	56	45.45
Post-test	33	70	100	80.06
N-gain				0.63

Normality Test Results

The purpose of the normality test was to determine whether the data were normally distributed. Using the SPSS 25 software and the Kolmogorov-Smirnov formula, the significance level for the normality test was set at 0.05. Pre-test and post-test value data were used for the normalcy

test. the learning outcomes of the students in the experimental and control groups as determined by the normalcy test. The research revealed that the normality test yielded a sig value of 0.133 for the experimental class's pretest and a sig value of 0.172 for the experimental class's posttest. In contrast, the control class's pretest significance value was 0.090, and its posttest significance value was 0.200 ($p > 0.05$), indicating that the data were normally distributed.

Homogeneity Test Results

The homogeneity test was conducted to determine whether the data sample had a homogeneous variance or not. The homogeneity test utilised the Levene test formula, which was assisted by the SPSS 25 program. Pre-test and post-test value data were used for the homogeneity test. According to the results in Table 3, the homogeneity test yielded a significance value (sig) > 0.05 for the learning outcomes of the students in both the experimental and control groups. Thus, it may be said that both classes' pre-test and post-test data are homogeneous.

Table 3. Homogeneity Test of Learning Outcomes

Ability	Class	N	Sig.	Category
Pre-test	Eksperiment Control	33	0.125	Homogeneous
Post-test	Eksperiment Control	33	0.750	Homogeneous

Hypothesis Test Results

Hypothesis testing was conducted to determine whether there was a difference in learning outcomes between students who used video media and those who used image media. The results of the independent sample t-test with a significance level of 5% obtained a sig. (2-tiled). The value of 0.000 is smaller than 0.05 ($p < 0.05$), so, according to the basis for decision-making in the independent sample t-test, it can be concluded that H_0 is rejected and H_1 is accepted. Thus, it can be stated that there is a difference in biology learning outcomes between video media and images in class VII students of SMPN 1 Gunungsari.

Comparison of Learning Outcomes Using Video and Image Media

Based on the research results in Tables 1 and 2, the learning outcomes of students using video media were higher than those using image media, as seen from the average post-test scores. These results align with several previous studies reporting that the learning outcomes of students using video learning media are higher than those using image media [18], [19], [20].

Differences in student learning outcomes are attributed to their level of interest in learning during class. Students taught using videos have a higher interest in learning compared to students taught using visual media, who have a lower interest. This finding is in line with the results of previous research conducted by [21], who also reported that the use of learning videos can be a strategy for increasing student interest in learning, as they can provide a

more engaging learning experience and help students more easily understand the material. This is supported by research conducted by [22], who reported that the learning outcomes of students with a high interest in learning are better than those with a low interest in learning. According to research, interest in learning is a student's attention or interest in the learning process, as demonstrated by active participation.

Video media has been found to be more successful in enhancing learning outcomes and student motivation because it produces a more immersive learning environment. This is in line with research conducted by [23] who stated that the use of video media is very effective in increasing student learning motivation. This is also supported by research conducted by [24] who also stated that student motivation in learning activities plays a role in improving student learning outcomes. Thus, it is concluded that video media has a greater impact on improving student learning outcomes than image media. The use of video media is highly effective because it can display movement, sound, and simulations that closely resemble real experiences. Video media also helps meet the needs of auditory and visual learners, while increasing student motivation and engagement. This is supported by previous research conducted by [25] who reported that the use of appropriate learning media plays a crucial role in creating an interactive and engaging learning process, thereby enhancing student learning outcomes.

Conclusion

Based on the study's findings and discussion, it can be concluded that the average post-test score of the experimental class was 92.09, and the average post-test score of the control class was 80.06. Thus, the learning outcomes of students taught with video media were better than those taught with images. The results of the independent sample t-test showed a sig. (2-tiled) A value of 0.000 ($p < 0.05$), which indicates a significant difference in biology learning outcomes between video media and images in seventh-grade students of SMPN 1 Gunungsari. The homogeneity test yielded a sig. value > 0.05 for the learning outcomes of the students in the experimental and control groups. Thus, it may be said that both classes' pre-test and post-test data are homogeneous. Seventh-grade students of SMPN 1 Gunungsari learn biology differently when using video media compared to when using photos. Students who use video media achieve better learning outcomes in biology than those who use photos.

Author's Contribution

Nur Janah: Collect data and compile the article; Mahrus & Khairuddin: Responsible person and article compiler.

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