The influence of the use of interactive videos to improve students' understanding of the diversity of flora and fauna in grade V of SDN Sepang

Norman Alfito[✉1]

[1] Elementary School Teacher Education Study Program, Serang, Universitas Pendidikan Indonesia

✉ fitomvb@gmail.com

Abstract

This study aims to analyze the influence of the use of interactive videos in improving the understanding of grade V students of SDN Sepang about the diversity of flora and fauna in Indonesia. The problem behind this research is the low level of students' understanding of biodiversity materials, which is caused by the level of internet utilization, conventional learning methods that are less interesting and limitations in observing flora and fauna directly. This study uses a quasi-experimental design method with a quantitative approach. The research sample consisted of 41 students of class V divided into two groups: experimental class and control class with a total population of 81 students. The experimental class was given learning using interactive video, while the control class used conventional methods. Data collection was carried out through pre-test and post-test, as well as documentation studies. The results showed a significant improvement in the understanding of students who used interactive videos. The average score of the post-test of the experimental class reached 8.4 which in the pre-test obtained an average result of 4.4. Meanwhile, in the control class, the increase was not significant from pre-test 7.7 to post test 8.5. The significance level based on the Wilcoxon Test is at 0.001 where the value is < 0.05 which means that the influence of interactive video is declared significant. The conclusion of this study shows that there is a significant differentiation or distance between the two groups, which means that the level of understanding is much different.

Keywords: interactive video; biodiversity; flora and fauna; science learning.

INTRODUCTION

Education is the main process in building individual abilities and character. As part of the education system, learning plays a vital role in achieving these goals. Education not only aims to transfer knowledge, but also to form attitudes, skills, and values that are relevant to the development of the times. In Indonesia, changes in the implementation of education continue to take place to answer the challenges of an increasingly complex era. The government, through Government Regulation Number 57 of 2021 concerning National Education Standards Article 12, stipulates that learning must be carried out interactively, inspiringly, fun, and provide space for students' creativity and independence. The implementation of this policy requires relevant, innovative, and able learning media that can stimulate active student involvement. The development of information and communication technology provides great opportunities in the world of education. Data from the Central Statistics Agency (2023) shows that 72.28% of elementary school students in Indonesia have used mobile phones, and 62.56% are connected to the internet. The use of this technology provides an opportunity for educators to integrate digital media into learning. However, in Serang City, the internet usage index only reached

67.41%, lower than other areas, such as Cilegon City which reached 83.67%. This condition is a challenge in utilizing technology to improve the quality of learning. In addition, research by UNICEF and Kominfo revealed that children use the internet for various purposes, such as seeking information, socializing, and entertainment. These findings show great potential to use technology strategically in supporting the learning process.

Previous studies have shown that visual-based learning, such as interactive videos, has a significant impact on improving students' memory. According to Silberman (in Rila, 2022), visual learning is able to increase students' memory from 14% to 38%. This is relevant in the context of the Independent Curriculum which emphasizes integrated thematic learning, such as Natural and Social Sciences (IPAS). Thematic learning is designed to provide a well-rounded and meaningful learning experience. However, in the material on the diversity of flora and fauna, students often face difficulties in understanding concepts due to the limitations of direct experience of seeing or feeling the object being studied. This challenge shows the need for learning media that can provide a more concrete and engaging learning experience. The main problem found is the low interest of students in studying social studies, especially in materials that are considered full of memorization. Data on the scores of grade V students of SDN Sepang shows that the average IPAS score only reaches 83, even though it meets the *Kriteria Ketuntasan Minimal (KKM).* However, this score is still at the lowest level compared to other subjects. Teachers also identify that students tend to be lazy to study social studies because they view it as a difficult, less interesting, and demanding subject than memorization. This condition requires a more innovative and fun learning approach to increase students' motivation and understanding.

This study aims to examine the effect of the use of gamification-assisted interactive videos in learning IPAS, especially in flora and fauna diversity materials, on the collaboration and understanding ability of grade V students of SDN Sepang. Gamification methods that involve small group games are integrated into learning to support the development of students' cognitive, affective, and social aspects. With this approach, students are expected to be able to meet the indicators of concept comprehension, such as explaining, summarizing and classifying material according to the dimensions of the process and knowledge (Anderson & Krathwohl, 2019). The emphasis on the collaboration aspect is also expected to be able to strengthen students' social skills, in line with the demands of 21st century learning. This research is expected to make a practical and theoretical contribution. Practically, this research offers innovative solutions for teachers in developing more interesting and effective learning strategies. Interactive videos and gamification can be tools that help teachers create fun and meaningful learning. Theoretically, this study adds insight into the effectiveness of the use of technology and gamification approaches in improving students' understanding of integrated thematic learning materials. The results of this research are expected to be a reference for the development of learning models that are relevant to the needs of students in the digital era.

METHOD

This study uses *a Nonequivalent Control Group Design research design*, which is a type of quasi-experimental design. This design involved two groups, namely the experimental group that received treatment in the form of the use of interactive videos and the control group that

used conventional learning methods. The two groups will be compared to assess the effect of treatment on students' ability to collaborate and understand the material. This design was chosen because it was in accordance with conditions in the field, where group allocation was not carried out randomly, but based on the existing conditions of the class. Participants in this study are grade V students of SDN Sepang. The determination of the sample was carried out using *the purposive sampling* technique, which is to select samples based on certain criteria that are relevant to the purpose of the research. The criteria used are grade V students who have the availability of supporting facilities for technology-based learning, such as access to electronic devices and basic skills in using digital media. The sample consisted of two classes, each acting as an experimental group and a control group.

The data collection techniques in this study included tests and observations of non-participants. The test is used to measure students' understanding of the material of flora and fauna diversity. This test is arranged in the form of objective questions that include indicators of concept understanding according to the dimensions of the process and knowledge. Non-participant observation was used to observe students' comprehension abilities in addition to social activities during the learning process. This observation was carried out by the researcher using a validated observation sheet. Data analysis is carried out through several stages. The first stage is a normality test using *the Shapiro-Wilk* test to check if the data is normally distributed. The second stage was a homogeneity test using *the Levene* test to ensure that the variance between the experimental group and the control group was homogeneous. To test the first hypothesis regarding the mean difference between the control and experimental groups, *the Mann-Whitney test* was used because the data did not meet the assumption of normal distribution. Meanwhile, to test the second hypothesis regarding the effect of the use of interactive video before and after the administration of stimulus in the experimental group, *the Wilcoxon* test was used.This analysis approach is designed to provide valid and reliable results in evaluating the effectiveness of the use of interactive video in improving students' collaboration skills and material understanding.

RESULTS AND DISCUSSION

The *pre-test results* showed that there was a difference in initial ability between the experimental class and the control class. In the experimental class, the average *pre-test* score was recorded at 4.4 with the highest score reaching 7 and the lowest score of only 1. In contrast, the control class had a higher average *pre-test* score of 7.7. In the control class, the maximum score obtained by students reached 10, while the minimum score was 5. This difference suggests that before the treatment was performed, the control class had a better initial level of understanding than the experimental class. This is likely due to factors such as the student's background or the learning approach previously used. After the treatment was carried out, there was a significant increase in *post-test* scores, especially in the experimental class. The average *post-test* score in the experimental class jumped to 8.4, with a maximum score of 10 and a minimum score of 6. This increase shows that the use of interactive videos has a great positive influence on improving student understanding. Meanwhile, the average *post-test* score in the control class also increased, but not as much as the experimental class. In the control class, the

average *post-test score* was recorded at 8.5, with the maximum score remaining at 10 and the minimum score increasing to 7. Although conventional learning methods applied in control classes are able to improve student learning outcomes, their effectiveness is not comparable to innovative methods applied in experimental classrooms.

When comparing the results between the experimental class and the control class, it was seen that the increase in the average score in the experimental class was more significant. The experimental class showed an average increase in scores of 4 points, from 4.4 in *the pre-test* to 8.4 in the *post-test*. On the other hand, the control class only increased by 0.8 points, from 7.7 in the *pre-test* to 8.5 in *the post-test*. This difference confirms that interactive video-based learning methods are more effective in encouraging student understanding than conventional learning methods. Based on these results, it can be concluded that the application of interactive videos has a greater positive impact on improving student understanding than conventional learning methods. These results can be a foothold for developing other innovative learning methods that are able to support student learning outcomes more effectively and comprehensively. These findings also provide an idea that the use of technology can be a solution to create a more engaging and productive learning experience. After describing the data of the research results, the steps taken are to conduct a series of tests from normality tests, homogeneity tests, to hypothesis tests. the first is a normality test using a test based on *Shapiro wilk*, here are the results:

Table.1 Normality Test Output

Tests of Normality

	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Itself.	Statistic	df	Itself.
Pre-test experiment	.230	40	.000	.903	40	.002
Post test experiment	.203	40	.000	.903	40	.002
For the control test.	.216	40	.000	.898	40	.002
Post test control	.208	40	.000	.882	40	.001

a. Lilliefors Significance Correction

Based on the results obtained, it can be concluded that the data in this study is not normally distributed. This is indicated by a significance value of less than 0.05. The interpretation refers to the assumption of the Shapiro-Wilk normality test, where the data is considered to be normally distributed if the significance value is greater than 0.05. However, if the significance value is below 0.05, the data is considered not to be normally distributed. This distribution mismatch is an important indicator in determining the right statistical analysis approach for data processing. Since the results of the normality test show that the data does not match the assumption of normality, the next step is to use nonparametric statistical methods to test the hypothesis. The nonparametric method was chosen because it does not require normally distributed assumptions and is therefore more suitable for analyzing data that are not normally distributed.

With this approach, hypothesis testing can still be validly performed even if the characteristics of the data distribution do not meet certain criteria. In this way the data analysis

becomes more accurate and relevant to the actual conditions. The decision to use nonparametric methods also highlights the importance of testing initial assumptions in statistics, as any violation of assumptions can affect the validity of the research results. Overall, these results highlight that the data analysis process must be tailored to the characteristics of the existing data to ensure accurate and reliable research results. The second test is a homogeneity test using the benchmark *of the levene test* with the following results:

Table.2 Homogeneity Test Output

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Itself.
POST TEST RESULTS	Based on Mean	.474	1	79	.493
	Based on Median	.041	1	79	.840
	Based on Median and with adjusted df	.041	1	66.324	.840
	Based on trimmed mean	.504	1	79	.480

Based on the output results presented, it can be concluded that the data is homogeneous as evidenced by a significance value of 0.480. This value is much greater than the set threshold of 0.05. This finding is in line with the assumption of the Levene test, where the homogeneity of the data is considered to be met if the significance value is more than 0.05. On the other hand, if the significance value is below this threshold, then the data is declared inhomogeneous or does not have uniform variants between groups. The homogeneity of these data is an important prerequisite in statistical analysis, especially in the context of hypothesis testing, to ensure that the differences identified are not due to uncontrolled variability. In this study, the data obtained from the results of the pre-test and post-test were stated to meet the homogeneity assumption. In addition, the data has also been verified not to be distributed normally based on the results of the previous normality test.

The combination of these characteristics makes the data suitable for analysis using the nonparametric hypothesis testing method. Nonparametric tests that do not rely on normal distribution assumptions also often require data homogeneity to ensure the accuracy of the analysis results. By fulfilling these two assumptions, namely homogeneity and not normally distributed, data processing can be carried out validly and produce reliable findings. The uniformity of variance reflected in the homogeneity test results underscores the consistency of the data characteristics between groups. This emphasizes that differences that may be found in the results of the analysis reflect the actual impact of the intervention and not the bias derived from data variability. After it was known that the data was not normally distributed and the data was homogeneous, the researcher chose the test Man Whitey Because it is most suitable for answering the formulation of problems regarding the difference between the experimental class and the control class. The following are the test output results Mann whitney Using data pre-test:

Table.3 Mann Whitney Test Outputs

Test Statistics[a]

	PRETEST
Mann-Whitney U	70.000
Wilcoxon W	931.000
With	-7.172
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: KELAS

Based on the hypothesis test assumption, if the significance value is more than 0.05, then the alternative hypothesis (Ha) is rejected and the null hypothesis (H0) is accepted. Conversely, if the significance value is less than 0.05 then the alternative hypothesis (Ha) is accepted and the null hypothesis (H0) is rejected. Based on the results of the Mann-Whitney test for pre-test data, a significance value of 0.001 was obtained. This value is less than 0.05, so it can be concluded that there is a significant difference between the experimental group and the control group. These findings show a real differentiation or value gap between the two groups. These results support the assumption that the learning methods applied in the experimental group and the control group have different influences on students' pre-test scores. This conclusion is also in line with the formulation of the first problem, which is to test whether there is a difference in the average score between the two groups. With the test results showing significant differences, it was evident that the average pre-test scores of the experimental and control groups were not the same, so an alternative hypothesis was accepted. These results provide a strong starting basis for continuing the analysis of post-test data, in order to evaluate the effectiveness of the learning methods applied. In addition, significant differences in pre-tests can also be a factor in the interpretation of the final results of the study, as it shows that the experimental and control groups had statistically different initial conditions. The last step taken is to conduct a hypothesis test to answer the formulation of the second problem, here are the results:

Table.4 Wlicoxon Test Output

Test Statistics[a]

	The End of the Test - Before the Test
With	-5.608b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Based on the results of the Wilcoxon test applied in this study, it can be concluded that the alternative hypothesis (Ha), namely an increase in student understanding, is accepted, while the null hypothesis (H0), which states that there is no improvement in student understanding, is

rejected. This conclusion is based on the basic assumption of the Wilcoxon test, where if the significance level is greater than 0.05 then (Ha) is rejected and (H0) is accepted. Conversely, if the significance level is less than 0.05 then (Ha) is accepted and (H0) is rejected. In this study, the significance level obtained was 0.001, which was clearly below the threshold of 0.05. This shows that there is a significant improvement in student understanding after the implementation of the learning method used. Thus, the generalizations made by the researcher correspond to the assumptions of the Wilcoxon test and reinforce the claim that the intervention provided succeeded in significantly improving student understanding.

These results not only support the research objectives but also provide relevant empirical evidence that the learning approach applied can result in significant changes in students' abilities. Therefore, these conclusions can be used to reinforce recommendations against the application of similar methods in other learning contexts, in the hope of having a similar positive impact. In this study, two main hypotheses were tested to provide relevant generalizations. The first hypothesis states that there is a difference in the average score between the experimental group and the control group, while the second hypothesis states that there is an increase in students' understanding of flora and fauna diversity in the experimental group after being treated using interactive videos. This study succeeded in proving both hypotheses, as will be explained further below.

The results of the first hypothesis test showed a significant difference in mean values between the experimental and control groups. Experimental classes using interactive video media showed higher average scores than control classes with traditional learning methods. Interactive videos with game elements provide an advantage in learning because of their attention-grabbing, interactive, and motivating nature. This medium not only presents visual information but also actively engages students through challenges, rewards, and assessments. Edgar Dale's Experiential Cone Theory (1996) supports the effectiveness of interactive video by integrating visual and auditory elements, which has been shown to improve student understanding. On the other hand, conventional learning methods tend to be less effective in providing interesting stimulation, so students are more passive and their understanding of the material is limited.

The second hypothesis that tests the improvement of students' understanding is also proven. Through the analysis of pretest and posttest scores, the experimental class showed a significant increase in understanding material about flora and fauna diversity. Interactive videos are designed to provide a multisensory learning experience that involves visual, auditory, and kinesthetic channels. With the game element, students feel motivated to learn through interactive activities that encourage exploration, critical thinking, and analysis. Piaget's Constructivist Theory (1970) supports this approach, in which students actively build understanding through interaction and reflection. This process allows students to not only understand theory, but also relate it to real experience, making learning more meaningful and effective.

CONCLUSION

Based on the results of the first hypothesis test, it was found that there was a significant differentiation between the experimental group and the control group before the treatment was

administered. This can be seen from the difference in the average pre-test score conducted before the study began. To ensure this differentiation, the *Mann-Whitney test was carried out* with a significance value of 0.001 (< 0.05), which indicated a significant difference between the two groups. These findings suggest that quasi-experimental research designs that use experimental and control classes are particularly relevant, as they are able to differentiate between the treatments given. With these results, an alternative hypothesis (Ha), which states that there is an average difference between the control class and the experimental class before the use of interactive video media, is accepted.

Furthermore, the results of the second hypothesis test showed an increase in students' understanding of flora and fauna diversity after the use of interactive videos. This improvement can be seen from the post-test results, where the experimental group experienced a much more significant average increase than the control group. The percentage increase in student understanding in the experimental group reached 91%, while the control group only experienced an increase of 9%. Wilcoxon's assay supports these findings with a significance value of 0.001 (< 0.05), which indicates a significant influence of the treatment. Interactive videos have been shown to be effective in improving student understanding, where initially the students of the experimental group were in the low understanding category, then increased to the good category after the treatment was given. Thus, the alternative hypothesis (Ha), which states that there is an increase in student understanding after the use of interactive videos, is accepted. Overall, the study shows that interactive video media is not only able to create significant differentiation between the experimental and control groups, but also significantly improves students' understanding of the diversity of flora and fauna.

REFERENCE

Anderson, L. W., & Krathwohl, D. R. (2019). A revision of Bloom's taxonomy: An overview. *Theory Into Practice, 41*(4), 232-241. https://doi.org/10.1080/00405841.2002.10509622.

BPS. (2023). *Statistik Pendidikan 2023*. Badan Pusat Statistik.

Dale, E. (1969). *Audiovisual Methods in Teaching. Third Edition. 3 ed.* Holt, Rinehart & Winston.

Jean, P. (1970). “Piaget“s Theory,” in Mussen, P. (Ed.) Carmichael’s Manual of Child. John Wiley & Sons.