

The Effect of the Scientific Approach Assisted by Animated Videos on Conceptual Understanding in Ecosystem Material in Class X MAS YPRA Batang Kuis

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Abstract: The study conducted at MAS YPRA Batang Kuis aimed to examine the effectiveness of a scientific learning model assisted by animated videos compared to a traditional learning model. The research involved Grade 10 students at MAS YPRA Batang Kuis, located in Batang Kuis District, Deli Serdang Regency. A total of 64 students participated, with Class X Science 1 assigned as the experimental class and Class X Science 2 as the control class. Data analysis showed that the experimental class obtained a pretest score of 930 and a posttest score of 2416, with an increase of 67.76% in the good category. The control class obtained a pretest score of 800 and a posttest score of 2110, with an increase of 62.08%, also in the good category. Hypothesis testing concluded that H_0 was accepted and H_a rejected, indicating a significant difference between the two learning models. Students taught using the animated video-assisted scientific model demonstrated better conceptual understanding than those taught using the traditional learning model.

Keywords: Animated Video-Assisted Learning; Conceptual Understanding; Scientific Learning Model.

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Introduction

For biology learning to run smoothly and fully achieve its learning objectives, students must be able to understand the concepts of the information presented by the teacher during the lesson. This requires learning that is interesting, enjoyable, and applicable to everyday life. Students must have a preliminary understanding of biology material before studying it in class because this understanding relates to themselves and their environment (Kurniawan, 2013). Sumarhadi (2010) explains why biology students find it difficult to memorize information. Bruner emphasized that each discipline or subject has a unique structure. This structure is composed of fundamental ideas. More can be understood if this structure is understood.

The structured and memorization-based nature of biology content causes students to use inappropriate learning strategies, which prevent them from understanding what they are learning and instead cause them to memorize it. As a result, students can develop misconceptions. Saptono (2011) emphasizes that studying biology encompasses a variety of processes and values used and developed in real life, making it more than just a collection of information or ideas. Due to the lack of integration between the process and the acquisition of information, many students struggle to develop their understanding of certain biological concepts, making it difficult for them to grasp the meaning flexibly. Students should find learning biology enjoyable and intellectually stimulating as they attempt to analyze and refine some ideas that may still be flawed. Learning biology will be more satisfying if it allows students to gain a deeper understanding of a concept.

Observation results at MAS YPRA Batang Kuis, the ideal educational atmosphere to support student learning; infrastructure and facilities, such as media, classrooms, and used textbooks, are good, but need to be supplemented with other textbooks if you want a comprehensive reference. Although the lecture approach is still often used in learning activities because of the abundant material, the teaching process is also very good. Although the lecture method has many benefits, for example, it is quick and easy to implement by teachers, many students do not pay attention during learning activities, so teachers cannot ensure that each student understands the concept of the material that has been given. This will affect student learning outcomes.

Based on interviews with biology teachers, the ecosystem material is simple, but because it covers various types of ecosystems, their interactions, and components, students become less interested and sometimes stop listening to the teacher's explanation. The ecosystem material was chosen for this study because, although often considered simple by teachers and students, when assessed using daily tests, only a small proportion of students' results meet the Minimum Passing Criteria (KKM). This means that students' mastery and understanding of the material must be assessed after they have studied it. Based on information gathered from biology teacher interviews, the

majority of students learn passively and are afraid to ask questions when they do not understand a concept. To overcome this problem and avoid misunderstandings, it is necessary to ensure students' conceptual knowledge. Based on the results of the ecology material test, less than 60% of students received a score of 75, which is higher than the KKM. This was found in 124 students in class X MAS YPRA Batang Kuis. One student obtained a score of 40, while several other students failed the daily test with a score of 65. To achieve good conceptual knowledge, a high conceptual understanding is required.

Problems have been identified that require the use of this technology as a biological learning tool and the development of unique and engaging learning experiences for students. These exercises can be implemented by summarizing key information and presenting it using engaging audio and animation. This is expected to improve learning outcomes by actively engaging students during learning. Given these difficulties, researchers made the scientific decision to use animated video learning materials. The use of animated videos as learning resources is considered very beneficial for teaching and learning activities in the classroom. These animated videos contain several questions designed to attract students' interest during learning.

The use of animated videos is expected to improve student understanding when teachers teach the material during learning activities, making learning activities very effective and efficient. (JE & Dayton, 1985) explained, "Additionally, instructional media utilize the power of images, words, and sounds to capture viewers' attention, assist them in comprehending concepts and learning information too complicated for verbal explanation alone, and help them get beyond time, size, and space constraints." This illustrates how learning materials that combine written, visual, and audio components can improve focus, help students understand concepts and acquire complex information that requires specific presentation, and overcome the constraints of time, space, and size. Islam also encourages humans to continuously develop and grow to meet the demands of the modern world. Humans must be more inventive and imaginative because times are constantly changing, which is good for them and for others.

As explained in QS Ar-Ra'd verse 11 which reads:

لَهُ مَعْقِبَاتٌ مِّنْ بَيْنِ يَدَيْهِ وَمِنْ خَلْفِهِ يَحْفَظُونَهُ مِنْ أَمْرِ اللَّهِ إِنَّ اللَّهَ لَا يُغَيِّرُ مَا بِقَوْمٍ حَتَّىٰ يُغَيِّرُوا مَا بِأَنْفُسِهِمْ وَإِذَا أَرَادَ اللَّهُ بِقَوْمٍ سُوءًا فَلَا مَرَدَّ لَهُ وَمَا لَهُمْ مِنْ دُونِهِ مِنْ وَالٍ

Meaning: "By Allah's command, the angels take turns accompanying him from before and behind to protect him (humans). Verily, until a person changes what is within him, Allah will not improve their condition. No one can resist evil when Allah wills it for a people, and He is their only source of protection. (QS Ar-Ra'd: 11)

From the explanation, the researcher overcomes the problems in class X MAS YPRA Batang Kuis from a learning approach taking the research title "The Effect of the Scientific Approach Assisted by Animated Videos on Conceptual Understanding in Ecosystem Material in Class X MAS YPRA Batang Kuis"

Methods

Class X MAS YPRA Batang Kuis, located at Jalan Nusa Indah Gang Melati No. 40 Tanjungsari, Batang Kuis District, Deli Serdang Regency, is the place where this research was conducted. The research was conducted in July and August of the 2024/2025 academic year, during the even semester. Four classes of Grade 10 were sampled. With 64 students, the experimental class was designated as Grade X Science 1, while the control class was designated as Grade X Science 2.

This study used an experimental research design. There were two groups: an experimental group and a control group. Before being administered to the sample, the test equipment was first tested outside the research class. Class X IPA3 MAS YPRA Batang Kuis became the subject of the instrument trial. This research used IBM SPSS 2.5 statistical analysis software to run the Kolmogorov-Mirnov test, which is used to test for normality. If the probability value is higher than 0.05, the data is considered normally distributed.

Results & Discussion

The study was conducted from July to August 2024. This experimental study involved two classes: a scientific approach was applied to class XIPA1 with the help of animated films, and class XIPA2 acted as a control group and was treated using traditional methods. To measure the level of conceptual knowledge of students in class XIPA 1 MAS YPRA Batang Kuis, the researchers used a pre-test and a post-test consisting of 15 multiple-choice questions.

Description of Pre-test Data for Experimental Class and Control Class

Table 1.

Description of Pre-Test Data

Experimental Class				Control Class			
Interval	Frk	Mean	Standard Deviation	Interval	Frk	Mean	Standard Deviation
81-100	8	30	7,071	81-100	1	25.8	8,765
61-80	23			61-80	3		
41-60	0			41-60	0		
21-40	0			21-40	0		
0-30	0			0-30	0		

N=31	N=31
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Description of Post-test Data for Control Class and Experimental Class

Table 2.

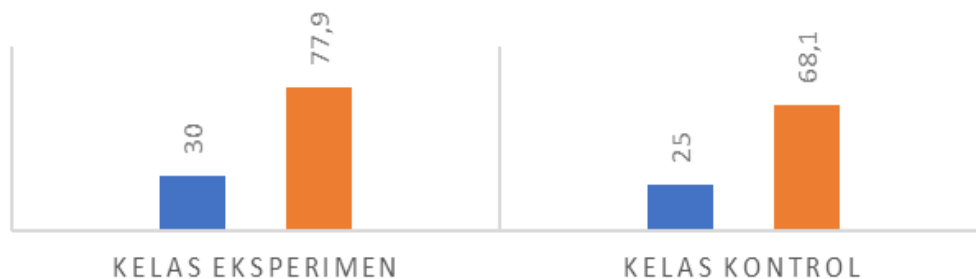
Post-test Data Description

Experimental Class				Control Class			
Internal	Frk	Mean	Standard Deviation	Interval	Frk	Mean	Standard Deviation
81-100	30			81-100	2		
61-80	1			61-80	28		
41-60	0	77.9	10,026	41-60	1	68.1	8,132
21-40	0			21-40	0		
0-30	0			0-30	0		
N=31				N=31			

For further clarity, students' conceptual understanding based on pretest and poster scores can be seen in general in graph 1.below:

Figure 1.

Comparison of the mean of the Experimental and Control Classes



The experimental class had a mean pretest score of 30 and a posttest score of 77.9, while the control class had a mean pretest score of 25 and a posttest score of 68.1, as shown in Figure 1. These findings indicate that, unlike traditional learning, the scientific learning approach supported by animated films has an impact on students' conceptual understanding skills.

Understanding the Concept of Experimental Class

Figure 2.

Percentage of Concept Understanding Category in Experimental Class



The data provided clearly shows an increase in student scores before and after the implementation, for example, as seen in the graph in Figure 2 above. scientific approach assisted by animated videos in the experimental class. It can be seen that the percentage of the high category of conceptual understanding is 45.16% with a total of 14 students. while the percentage of the medium category is 54.83% with a total of 17 students. Table 3 below displays the conceptual understanding scores completed by students in the experimental class:

Table 3.

Summary of N-Gain Pretest and Posttest Results

Mark	Pretest	Posttest	N-Gain	Percentage	category
	2416	930	0.6076	60.76%	
Mean score			60.76%		

Understanding the Concept of Control Class

Figure 4.

Percentage of Pre-test and Post-test Value Categories



The results of the conceptual understanding ability scores carried out by students can also be seen in table 4:

Table 4.

Summary of N-Gain Pretest and Posttest Results

Mark	Pretest	Posttest	N-Gain	Percentage	category
	2110	800	0.6280	0.6208	
Mean score			62.08%		

The graph in Figure 5 below shows a comparison of conceptual understanding between the experimental class and the control class. Based on the data from the percentage of pretest and poster scores in the experimental class and the control class above:

Figure 5.

Comparison of Pre-test and Post-test Value Categories



Based on Figure 5 above, it can be seen that the experimental class results data with a medium category of 54.83 < compared to the control class which is 90.32, while the percentage data for the high category of the experimental class is > 45.16 compared to the control class of 9.67. while for the low category level, both classes have no percentage for the low category. From these data, it can be assumed that the scientific approach assisted by animated videos can increase the level of students' conceptual understanding in biology subjects for ecosystem material.

Pre-Hypothesis Testing of Research (Normality and Homogeneity Test)

Table 5.

Normality Test Results

Class	Sighting	Significant table	category
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		(≥ 0.05)	
Pret-test Experiment	0.85	0.05	Normal
Post-test Experiment	0.120	0.05	Normal
Pre-test Control	0.76	0.05	Normal
Post-test Control	0.110	0.05	Normal

This shows that the data is normally distributed and meets the requirements of the normality test.

Table 6.

Results of Homogeneity Test

	Sig.hitung	Sig.table (≥ 0.05)	category
Based on Mean	0.85	0.05	Homogeneous

The data in Figure 6 above, the post-test results for the experimental and control classes are 0.234, which means that $0.234 \geq 0.05$. Data must be homogeneous (have the same variance) in order to pass the homogeneity test.

Hypothesis Testing

Table 7.

Hypothesis Test Results

Class	Sig.(2-tailed) (≤ 0.05)	category
Post-test Experiment	$0.00 \leq 0.05$	Accepted
Post-test Control	$0.00 \leq 0.05$	Accepted

Based on Table 7, it is explained that $H_a = 0.00 \leq 0.05$ ($t_{count} \leq t_{table}$) \rightarrow There is an influence of the scientific approach assisted by animated videos on the conceptual understanding of class X MAS YPRA Batang Kuis students.

This quantitative study aims to determine whether the scientific learning approach supported by animated videos has improved the understanding of class X MAS YPRA Batang Kuis students. It can be said that the scientific learning approach has a significant impact on the level of conceptual understanding of students in completing learning activities in class because it reduces student boredom through the use of animated videos. (KEMENDIKBUD 2013). Data analysis from the pre-test and post-test results of the experimental and control classes shows this. The presentation of the findings of this study is presented below:

This research was conducted in the experimental class, X IPA1, where students were taught using animated video-based scientific methods. A total of 15 multiple-choice questions were created after the test data were processed. To assess students' understanding of the learning ideas and their level of mastery of the material, the researcher administered a descriptive statistical analysis test. The mean score was 30,

with the highest score being 45 and the lowest being 20. Furthermore, in the post-test, the highest score was 98 and the lowest was 60 with a mean score of 77.9. Judging from the total mean pre-test and post-test scores, the experimental class experienced an increase in students' understanding of biology concepts. This shows $\text{sig. hitung} \geq \alpha$ ($0.123 \geq 0.05$), which is based on the results of statistical data processing for the experimental class on the post-test value obtained $\text{sig. hitung} = 0.123$ with ($\alpha = 0.05$).

In contrast, the post-test value for the control class, which uses a traditional learning approach, is $\text{sig. hitung} = 0.110$ with $\alpha = 0.05$, which shows $\text{sig. hitung} \geq \alpha$ ($0.110 \geq 0.05$). Thus, the data on the understanding of biology concepts of students in both courses are normally distributed. $\text{Sig. hitung} \leq \alpha$ ($0.00 < 0.05$) shows that the data on the value of students' understanding of concepts in biology courses in both classes have homogeneous variance values. Based on the results of the hypothesis test analysis using the t-test on the post-test obtained $\text{sig} (2\text{-Tailed}) = 0.00$.

Based on the T-test calculation, H_0 is accepted while H_a is rejected because the calculated t-value is smaller than the t-table. Therefore, it can be said that, compared to the understanding of students taught using traditional learning methods, a significant influence was found on their understanding of biology topics taught using a scientific approach assisted by animated films.

This is reinforced by scientific method activities assisted by animated videos. This learning method focuses more on helping students understand the material and aims to ensure they complete assignments accurately, thereby enhancing their understanding of the material being studied (Amri 2013). With the help of animated video content, students can simultaneously watch and listen to videos presented in a more varied way with engaging and lively visuals, claims Rochmania (2022). This can increase student interest in learning. Compared to the control class using traditional learning methods, this is one factor contributing to the increased understanding of biology learning concepts in the experimental class.

On the other hand, students in the control group showed lower levels of motivation and were less likely to engage in learning activities. Because the teacher delivered the material and the only medium used was the textbook, students became too passive. As a result, many students struggled to focus during learning, which may have impacted their understanding of biological principles. Because all educators want a successful and enjoyable teaching process, students are required to participate more actively in learning activities to achieve educational goals when learning is more student-centered (Ahdar 2019).

This is also based on the findings of a previous study entitled "The Effect of Scientific Approach on Students' Conceptual Understanding of Fungi Material in Class X of SMA Negeri 1 Indralaya" conducted by Prilly Pricilia in 2020. This study used a one-group pretest-posttest design approach, and the results of the first and final exams showed an increase in student scores in each category of conceptual understanding. From a mean

score of 54.5 to 77.8, students' conceptual understanding of the topic of fungal biology taught using a scientific approach increased by 23 points. In addition, the scientific approach of class X for conceptual understanding of fungi in SMA Negeri 1 Indralaya was more interesting than Prilly Pricilia's scientific approach. Therefore, grade X students at MAS YPRA Batang Kuis can benefit from learning activities that use a scientific approach and animated films to help them better understand the principles of biology in ecosystems.

Conclusion & Recommendation

From the research that has been conducted at MAS YPRA Batang Kuis school, it can be concluded that the scientific method model assisted by animated videos is superior to the traditional learning model. The overall pretest and posttest results after the treatment show this. This is indicated by the pretest score of 930 and the overall score on the poster 2416 in the experimental class. So the results of the experimental class score of 67.76% are stated as good. while the total value of the pretest score is 800 and the total value of the posttest score is 2110. So the result of the percentage increase of 62.08% is stated as good. Thus the hypothesis is stated that H_0 is accepted and H_a is rejected. Students in the experimental class who use scientific methods are often better at understanding concepts compared to students in the control class who use traditional learning techniques. This shows that the ability of Class X students at MAS YPRA Batang Kuis in understanding concepts is influenced by scientific learning methods.

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