



The Effectiveness of Using Digital Learning Media on High School Students' Biology Learning Independence

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Abstract

This research is motivated by the low level of student learning independence in the learning process, which is indicated by the lack of initiative, self-confidence, discipline, and responsibility of students in learning. In addition, the low awareness of students in utilizing digital media or technology also causes limited interaction between teachers and students. This shows that the use of digital learning media is not fully effective in increasing student learning independence, because students' self-awareness in managing time, responsibility, and motivation for independent learning still need to be improved. The purpose of this study was to determine the effectiveness of the use of digital learning media on student learning independence in the excretory system material. This type of research is a quasi-experimental design. The population of this study was all 72 students of class XI MIA 1 and 2, and the sample used was also 72 students of class XI MIA 1 and 2. The data collection technique used a learning independence questionnaire, which consisted of 25 pretest and posttest statements. The data obtained were then analyzed using the SPSS 22.0 application for windows. Based on the results of the Analysis of Covariance (ANCOVA) test, the effectiveness value obtained was $0.001 < 0.05$. It can be concluded that digital learning media such as learning videos provide effectiveness towards the learning independence of grade XI high school students in biology subjects. This shows that the use of digital learning media such as learning videos has a positive effect and can improve students' independent learning abilities, increase initiative and creativity, and facilitate students to have a better understanding of the learning concepts taught.

Keywords: Digital Learning Media, Biology Learning, Excretory System, Learning Independence

INTRODUCTION

Education is a process of pioneering and leading other individuals to overcome problems that are fundamentally deviant from being resolved well by themselves. Education comes from the English word "education" and the Latin word "ducere," meaning to lead, with the prefix "e," meaning to out. This understanding of education is intended to be a foundation for guiding other individuals to overcome the problems they face. Further, a more detailed understanding is that education originates from the word "didik," meaning to nurture, to provide training in morals and intellectual intelligence. Then, the word "didik" gets the prefix "pe" and the suffix "an," thus becoming the word "pendidikan," meaning a treatment in matters of how to educate and so on. (Fadhilah & Rochintaniawati, 2021).

Education is also a crucial pillar in developing quality human resources. In the era of the Industrial Revolution 4.0, digital technology has become an integral part of various

aspects of life, including education. The use of information and communication technology (ICT) provides new opportunities for developing more effective and engaging learning media. One form of this innovation is digital learning media (Purwanto, 2008).

Digital learning media are tools, platforms, or learning resources based on digital technology designed to support independent, interactive, engaging, and flexible learning processes. These media encompass a variety of formats, such as videos, animations, simulations, e-books, learning applications, and online platforms accessible through electronic devices such as computers, tablets, or mobile phones. With the ability to present material visually and interactively, digital learning media It helps students understand complex concepts and facilitates independent learning tailored to their individual needs and pace. Furthermore, this medium allows students to learn anytime and anywhere, thus supporting more adaptive and efficient learning. (Niama, 2023).

Biology is one of the subjects taught to students in high school. Biology is considered one of the most difficult subjects to learn. Biology is a natural science subject that involves many concrete and abstract concepts. This is one of the reasons why students struggle with learning. Biology is a subject that emphasizes students' conceptual understanding. Conceptual understanding is a process, method, and action to understand or know in detail about the concepts of the material being taught, which is reflected in the improvement of student learning outcomes.

Conceptual learning focuses on aspects of category formation and using concepts to interpret problem-solving experiences. This opinion is supported by Anderson, who stated that the development of theories varies, presenting such concepts in the form of schemes and examples. Theoretical information processing includes the idea of conceptual understanding because the essence of meaningful learning is key to higher-level thinking. In education, supporters of constructivism really need conceptual learning because it is the basis of knowledge constructed by students. In relation to its future functions and tasks, learning in high school is directed at conceptual understanding so that learning becomes meaningful and oriented towards problem solving. (Mau, 2023)

Students are exposed to a more in-depth and complex curriculum, particularly in biology, which encompasses fundamental concepts such as cell structure, organ systems, and ecosystems. Effective learning depends not only on teachers' mastery of the material but also on students' ability to learn independently. Digital learning media, such as instructional videos, interactive summaries, and educational apps, can be effective tools to support independent learning. However, despite the abundance of digital resources available, there is no guarantee that all students will be able to utilize them effectively. Accessibility, motivation, and students' technical skills in using technology can influence the effectiveness of digital learning media. (Ormrod & Ellis, 2000). The results of initial observations conducted at SMA Negeri 1 Padang Bolak show that in the teaching and learning process, teachers have implemented digital/technology-based learning media, including using an infocus as a tool to play learning videos from the YouTube application or display PowerPoint (PPT), and other digital media, however, students' self-awareness in utilizing digital learning media is still low.

Most students only use digital media when asked by the teacher and have not yet had the initiative to access or study the material independently. Some students also tend to use

digital devices for other activities such as entertainment or social media, not for learning. This shows that the use of digital learning media is not fully effective in increasing student learning independence, because students' self-awareness in managing time, responsibility, and motivation for independent learning still needs to be improved. Based on the test results, researchers felt the need to determine the effectiveness of using digital-based learning media as an effort to improve student learning independence. Analyzing student learning independence can be done in various ways, one of which is by using student worksheets (LKPD) containing problems, with each group presenting a different problem. Then, a test is conducted to measure the extent to which the use of digital learning media affects student learning independence. The test used in this study was a student learning independence questionnaire.

RESEARCH METHODS

This research uses an experimental method. Experimental research is a quantitative research approach that aims to test the causal relationship between two or more variables by manipulating the independent variable and measuring its impact on the dependent variable under controlled conditions. This method involves a treatment-treated experimental group and a control group to compare the results, as well as the use of statistical data analysis to draw objective conclusions. The researcher's reason for using this research method was to test variable X against variable Y. In this study, the independent variable (the use of digital learning media) had already occurred when the author began observing the dependent variable (student learning independence). The relationship between the independent and dependent variables had occurred naturally.

RESULTS AND DISCUSSION

The application of different learning media to classes XI MIA 1 and XI MIA 2 resulted in different learning independence scores. The research data obtained were based on the results of hypothesis testing using the Analysis of Covariance (ANCOVA) test shows that there is effectiveness in the use of digital learning media on student learning independence in biology subjects for class XI of SMA Negeri 1 Padang Bolak. Before the learning process was carried out in the experimental group, the average pretest score obtained based on descriptive analysis fell into the "Moderate" category, as did the control class, which fell into the "Moderate" category.

Based on this, it can be said that the initial conditions of students in both the experimental and control groups before being given treatment did not differ significantly. This is because, prior to the research and treatment, both groups were taught by the same teacher and used the same learning method, namely lectures and question-and-answer or assignments. Lecture learning methods are more teacher-centered, thus having weaknesses such as making students less actively involved in the learning process.

The learning independence of students taught using direct lecture methods differs from that of students taught using digital learning media such as learning videos. This can be seen based on the results obtained after being given treatment, the average posttest score of student learning independence from the descriptive analysis results in the experimental group fell into the "Very High" category, while in the control group, the average posttest score of student

learning independence fell into the "Moderate" category. The difference in posttest scores between the two groups was very different. This occurs because in learning using digital learning media such as learning videos, students can repeat the learning videos at school or at home if they do not understand the lesson. This teacher minimizes direct explanations and more effective one-on-one interactions with students.

The interaction in the learning process provided by the experimental and control classes has a significant difference, even though both classes are in the same initial condition and the level of learning independence is not much different. Class XI MIA 1 as the experimental class gives more focus and attention to every instruction given by the teacher. Students are also more active in asking questions in the discussion process and working on each assignment given.⁴⁰ Students who have learning independence will know how they learn and know the learning strategies used so that the learning process will run optimally.

The implementation of biology learning with digital learning media such as learning videos can be described as very good student learning independence in understanding the concepts of biology material. Students appear more prepared in the implementation of learning because the day before they had studied the excretory system material from learning videos sent by the teacher. In this case, maximizing the interaction between teachers, students, and their environment by utilizing learning media that can be accessed online by students and is able to support the learning material. When compared with class XI MIA 2 as a control class, students' attention and focus are still very lacking, including in understanding each instruction given by the teacher.

The experimental class that implemented digital learning media, such as instructional videos, showed greater enthusiasm for problem-solving, as seen during group discussions, where each student took the initiative to find ideas or answers to the issues being discussed. Furthermore, by implementing these learning media, students became more focused in learning the material being taught requires students to learn more independently.

Factors contributing to student learning independence when implementing instructional videos as a learning medium are enhanced, and they are inseparable from the activities involved in the learning process. The first stage is learning preparation. Student readiness is crucial. If students are mentally and physically prepared for learning, they can create a conducive learning environment and optimize learning time. Learning preparation also impacts students' self-control. Learning preparation that involves problem-solving exercises and the application of concepts can help students develop their self-control skills when facing challenging or complex situations. Based on the data obtained, students' self-control skills increased significantly, with a difference of 10.4 points between before and after the implementation of digital learning media. Students who are able to control themselves during the learning process at school will display positive behavior because they are able to organize, guide, organize, and direct forms of behavior that can lead to positive consequences.

The second stage involves accessing materials and student activities, such as asking questions and accessing materials and activities. Student activities, such as asking questions and accessing materials, demonstrate readiness to participate in the learning process. Digital learning media, such as instructional videos, can train students to be more active. Before face-to-face learning begins, students in the experimental class study independently at home by watching instructional videos provided by the teacher. This is very helpful for students in the

experimental class due to the time and place of learning be flexible and the content provided can be studied repeatedly as often as students want, thus increasing students' confidence and responsibility and making them more prepared and active when participating in face-to-face learning in class, and becoming more courageous in asking questions about things they don't understand.

The third stage is providing group assignments. Providing group assignments in digital learning media can increase student engagement, stimulate discussion among students, and facilitate collaborative learning. This stage also trains students' learning independence by taking responsibility for their own part and ensuring they fulfill their obligations within the group. Based on the data obtained, students' ability to take responsibility has significantly increased, with a difference of 13.2 points between before and after the implementation of digital learning media such as instructional videos.

The fourth stage is a discussion to monitor group assignments. Discussions in learning can stimulate students' critical and analytical thinking, as they are exposed to various perspectives and arguments from other students, which can help develop critical thinking and information analysis skills. This stage also fosters student initiative, encouraging students to seek out additional sources to deepen their understanding of the solution to the problem.

The fifth stage is testing the results of group assignments. This testing is conducted using presentations, where students play a crucial role in the learning process. Presentations can help students improve their communication skills and self-confidence. Based on the data obtained, in the experimental class, students' self-confidence in digital learning media has improved which was significant with a difference of 12.9. Students were confident in conveying ideas during the learning process because before the learning process, they had studied, understood, and noted important things in the learning video provided previously. The final stage is evaluation, which is an important process that aims to measure the achievement of learning objectives, understand the extent of students' understanding of the subject matter that has been given during the teaching and learning process, and provide useful feedback for further improvement and development.

Table 1.1 Results of Analysis of Student Learning Independence

Descriptive Statistics	Learning Independence Questionnaire Results Score			
	experimental class		control class	
	pretest	posttest	pretest	posttest
Number of Samples (N)	36	36	36	36
The highest score	88	97	84	86
Lowest Value	57	77	50	52
Average (Mean)	72,86	87,00	69,44	71,81

Based on the data obtained, students' ability to behave in a disciplined manner has increased significantly, with a difference of 11.8 points between before and after the implementation of digital learning media such as learning videos. Student discipline in school is a crucial aspect of learning, as it fosters awareness of the obligation to comply with established rules, such as carrying out tasks related to the lesson.

Table 1.2 Average Value of Each Indicator

Indicator	experimental class		category	control class		Category
	pretest	posttest		pretest	posttest	
responsibility	74,3	87,5	ST	70,1	70,6	S
initiative	63,1	85,5	ST	59,5	64,7	S
self confident	75,4	88,3	ST	73,7	75,6	T
control yourself	74,8	85,2	ST	66,5	69,8	S
discipline	76,5	88,3	ST	77,6	78,0	T

The selection of digital learning media and the methods used in the learning process are key to the success of learning activities, providing a direct impact on students. Teaching is not merely about transferring knowledge but also about experience and role models. Student interest in digital learning media is evident in the atmosphere during the teaching and learning process, where students feel comfortable, motivated, enthusiastic, and actively engaged in class, as well as communicating effectively and understanding the material presented by the researcher. However, some students remain passive when using digital learning media, particularly when presenting group discussion results. Some students lack confidence in presenting their findings. Overall, however, students respond well to and understand the material when using digital learning media.

The most important part of learning is the media used. Therefore, media is needed that can support active, independent learning processes and can overcome some of the difficulties experienced by students. Media used in the learning process These are digital media such as instructional videos and student worksheets (LKPD) provided to students through applications. By utilizing digital media as a learning tool, students can easily access teacher-provided materials, submit assignments more efficiently, and collaborate, communicate, and interact at any time. Based on the results of data analysis obtained through the Analysis of Covariance (ANCOVA) test, the use of digital learning media has proven effective in increasing student learning independence. This is indicated by a significance value (sig) of $0.001 < 0.05$. This value means that H_0 is rejected and H_1 is accepted, indicating that digital learning media, such as learning videos in biology, are effective in increasing student learning independence.

CONCLUSION

Based on the data analysis and discussion that has been presented, it can be concluded that the use of digital learning media is effective in improving student learning independence. This is shown from the results of the hypothesis test using the Analysis of

Covariance (ANCOVA) test, namely $0.001 < 0.05$. From the results of these calculations, it is proven that H_0 is rejected and H_1 is accepted. Thus, the use of digital learning media is effective for student learning independence in biology subjects in class XI of SMA Negeri 1 Padang Bolak.

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