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Comparison of The Learning Outcomes of Junior High School Students Utilizing Audio-Visual and Chart Learning Media to Study Ecosystem

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Abstract Teachers require knowledge pertaining to which types of learning media are most effective for teaching certain concepts in scientific disciplines. The audio-visual learning media and two-dimensional charta learning media may be utilized to aid instructors in educating junior high school pupils about ecosystems. This research seeks to compare the use of audio-visual learning media with two-dimensional charta learning media to educate junior high school students of Negeri 2 Babalan about ecosystems. The method of study used was quasi-experimental, and the research sample consisted of two classes of eight seventh-graders from SMP Negeri 2 Babalan, chosen via cluster random sampling. The research instrument was a multiple-choice test of cognitive learning outcome. The average value for the biology learning outcomes of seventh-grade SMP Negeri 2 Babalan students who are taught ecosystem topics via audiovisual learning media is 79.26, and for the class who are taught ecosystem topics through chart learning media is 73.47. The results demonstrate that there is a significant difference between the learning outcomes of class VII SMP Negeri 2 Babalan students using audiovisual media and chart media for ecosystem materials. This research concludes that the use of audiovisual learning media by junior high school instructors to teach ecological content is superior than the use of charta media in terms of the cognitive learning results of students.

Keywords: Learning media, Audio-visual learning media, Charta learning media, Ecosystem, Cognitive learning results

INTRODUCTION

Every learner is unique in their approach to studying biology. The interests, talents, enjoyment, experiences, and learning styles of each student are unique. Because some kids learn better visually while others learn better audibly, the instructional methods used must be tailored to the individual needs of each student (Syahfitri, 2011).

For all students to participate in learning activities, instructors must create learning opportunities. Teachers are called upon in this situation to serve as facilitators, assisting students in the process of teaching and learning. Students want their teachers to make learning entertaining, engaging, and intellectually stimulating for them.

Teachers are agents of learning innovation, thus they must be able to generate new ideas for teaching and learning. As a result, teaching and learning activities need the utilization of learning media. Students may increase their knowledge with the use of learning media (Ghory & Ghafory, 2021; Gusmaizal, 2015). According to Shabiralyani et al. (2015), the majority of teachers and students see the usage of audio-visual media aids positively.

The SMP Negeri 2 Babalan school has previously been seen by researchers to have a projector attached to a laptop or computer, which is subsequently projected onto a screen. However, this resource is seldom used over the course of instruction. Teachers employ only media pictures drawn from books or charts in the teaching and learning process.

The researcher interviewed a teacher at SMP N 2 Babalan and found that one of the obstacles was the usage of audio-visual technology that was not well understood and the restricted amount of time the instructor had throughout the teaching and learning process. In the previous academic year, around 60% of students met the minimal completion requirement (KKM) for biology study, while the remaining 40% fell short. Whereas the KKM that the school has adopted is 75.

The use of audiovisual media in education is one example of how technology is being used to improve education. Visual aids may make teaching and learning more effective and easy. The use of audiovisual media in ecological materials is essential. Multimedia learning, including audio-visual components, has the potential to enhance student learning outcomes (Harahap et al., 2019). According to research conducted by Ashaver & Igyuve (2013), the usage of audio-visual media has various benefits, including increased student involvement and interest, and may be utilized as a resource for learning. It is necessary to have a variety of learning resources and media available for the classroom learning process to be effective (Harahap et al., 2020).

This ecosystem information must be presented through media in order to prevent pupils from speculating about the interconnections between the various ecosystem components. It is important for students to learn about ecosystems. Students who are

aware of their environment tend to be environmentally literate and take better care of the environment (Febriani et al., 2020).

Lack of student interest in the learning process leads to a decline in student achievement (Nasution et al., 2017). Students don't become bored when they use audiovisual medium to learn about ecosystems, and they're more likely to be interested in the subject matter. Because students aren't being placed in real-world situations, this method also saves money and time.

According to Syahfitri (2011), following the creation of science learning audiovisual medium for class VII students of SMP Negeri 1 Lubuk Pakam showed to be more effective compared to before the development. Audiovisual media has an average score of 79.56, whereas chart media has an average value of 69.33, according to study by Ervina (2012).

Is it more vital to use three-dimensional media in the classroom than two-dimensional media? Due to the fact that various educational resources have unique characteristics. Teachers have to do a better job of explaining abstract stuff in order to help pupils grasp it.

A study comparing the learning results of students in junior high schools who are taught using audiovisual media with students who are taught using chart media (two-dimensional graphics) on ecosystem materials is warranted based on this description.

METHOD

Research Design

This study was done at SMP Negeri 2 Babalan in Pangkalan Berandan, Langkat Regency. In this research, the population comprised class VII SMP N 2 Babalan, which had 8 classes with a total of 326 individuals. This study's sample was collected using "Cluster Random Sampling." There are 76 pupils in total. Class VII 1 is taught using audiovisual learning media, whereas class VII 3 is taught using two-dimensional chart learning media.

In this research, the independent variables were learning with audiovisual media and learning using charta media. The dependent variable in this research is student understanding of ecosystem-related content.

This study is quasi-experimental in nature (quasi-experimental research and this research design uses a randomized control group pretest-posttest design). Two sets of research samples were randomly selected from the population for this investigation. The objective of quasi-experimental research is to collect data in situations when it is impossible to control or modify all important factors.

During the research's execution, the two classes received different treatment. The first class uses audiovisual medium, whereas the second class uses chart media. Table 1 provides further information.

Table 1. Research design.

No.	Class	Pre-test	Treatment	Post-test
1.	VII 1	T_1	X_1	T_2
2.	VII 3	T_1	X_2	T_2

Description:
T_1 = Pre-test
T_2 = Post-test
X_1 = Treatment with audiovisual media
X_2 = Treatment with charta media

Instrument Test

This study's data gathering instrument is a multiple-choice test. This test of learning outcomes is used to evaluate pupils' cognitive ability. The exam is used to measure student learning outcomes before to and during exposure to audiovisual and graphic media.

The test consisted of 25 questions with four possible answers. This test is administered during the pretest and posttest. Before the test is administered to the sample class, it will be evaluated for its validity, reliability, question complexity, and capacity to differentiate.

Table 2. Research instrument grid.

Indicator	Cognitive ability level						Total
	C1	C2	C3	C4	C5	C6	
Identify the units in the ecosystem and state the sun is the main source of energy.	1, 5, 7	6, 10	9, 12, 18, 21	8, 22	14, 15	17	**14**
Describing in the form of a food chain diagram and food webs based on observations of an ecosystem.	11	2, 3	4, 24, 25	23	13, 20	16, 19	**11**
Total	**4**	**4**	**7**	**3**	**4**	**3**	**25**

Research Procedures

The research consisted of the following phases

The Preparatory Phase

a. Conducting a survey: Conduct a preliminary survey of the institution where the study will be conducted. The preliminary survey was done by direct observation of the school's biology instructor and the pupils who are the focus of the study.

b. Establishing a research agenda: The research timeline was formed beginning with the commencement of the observation and continuing until the research was conducted; beginning in January, when the observation was conducted, the research proposal was created up to the research stage.
c. Create an implementation strategy for learning (RPP): With the creation of lesson plans, researchers will be more accountable and directed in carrying out their jobs, resulting in optimum achievement of learning goals.
d. Prepare media: The supplied media include of educational movies and images pertaining to ecosystems.
e. Prepare exam questions: Before exam questions are sent to students for study, they must be verified.

The Research Implementation Phase

a. The purpose of the pre-test is to assess students' understanding of ecological materials before providing them with an explanation of the goals utilizing audiovisual media and graphics.
b. In the first class, audiovisual learning is applied to learning, and in the second class, charta learning is applied to learning.
c. Administering a post-test, after the completion of the teaching and learning process, a post-test is administered in both courses to measure the amount of student learning success.
d. Following the data analysis, the data analysis test was conducted to determine the processing of student learning outcomes, utilizing the normalcy test, the homogeneity test, and the hypothesis test.

Data Collection Technique

Tests are administered as a means of data collecting. Before the learning materials are distributed, a pre-test is administered to two sample classes. Then, media charta and audiovisual media learning were provided. After teaching the ecology information to the two sample classes, a test is administered. The objective is to determine the degree to which researchers' learning outcomes are realized.

The test instrument's validity will be evaluated using the Product Moment standard test, and its dependability will be evaluated using the K-R standard test. The test instrument will also be evaluated based on the question's degree of difficulty and discriminatory power to assess if the questions are acceptable for usage.

The outcomes of the research will be examined for normalcy and homogeneity before the appropriate strategy for testing the hypothesis is established. In this study, a t-test will be conducted.

FINDINGS AND DISCUSSION

The average score on the pre-test was 47.57, according to the data summary of audiovisual class learning results. The greatest value was 64 with a frequency of 3, and the lowest was 32 with the same frequency. The audiovisual class pretest had a standard deviation of 9.78 and a variance of 95.64.

The average score on the pre-test was 45.89, according to a data summary of charta class learning results. The greatest number is 64 with a frequency of 2, while the lowest is 32 with a frequency of 3. The standard deviation and variance of the charta class pre-test score are 8.25 and 68.06, respectively. The following graphic (Figure 1) illustrates the comparative significance of data on audiovisual class pretest learning results and data on charta class pretest learning outcomes.

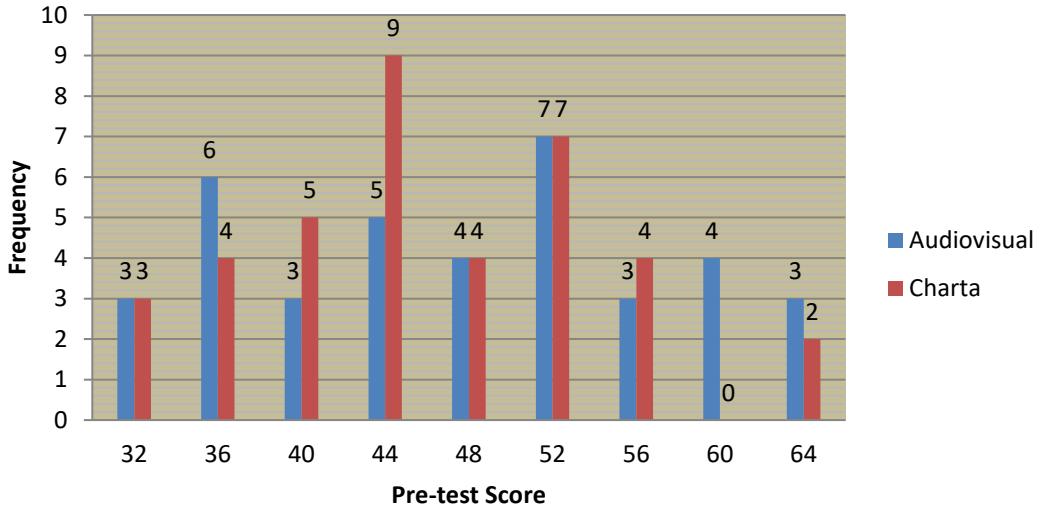

Figure 1. Graph of pretest scores for audiovisual and charta class students.

The average post-test score was 79.26, according to the quantitative research of the audiovisual class's learning results. The highest score with frequency of 3 was 96, while the lowest score with frequency of 3 was 64. The post-test standard deviation for audiovisual class was 9.05, and the variance was 81.90.

The average post-test score was 73.47, as shown by the data summary of charta class learning outcomes. The highest value was 96, which occurred twice, while the lowest value was 60, which occurred four times. The posttest standard deviation for the charta class was 9.36, and the variance was 87.60.

The following graphic (Figure 2) illustrates the contrast between the post-test learning outcomes data for the audiovisual class and the post-test learning outcomes data for the charta class.

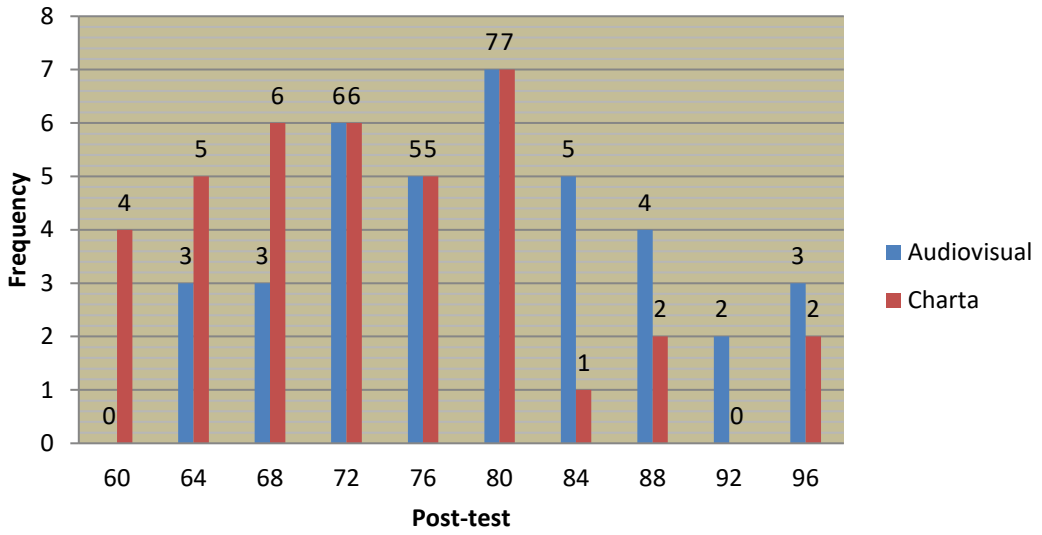

Figure 2. Graph of post-test scores for audiovisual and charta class students.

Using the Liliefors (L) test, the normality of the study data was evaluated. According to the findings of the calculations, the two samples are regularly distributed. Table 3 presents the results of the normality analysis of the study data.

Table 3. Research data normality test results.

No.	Research Sample	L_{count}		L_{table}	Interpretation
		Pre-test	Post-test		
1.	Audiovisual Class	0,1178	0,1038	0,1437	Normal
2.	Charta Class	0,1397	0,1137	0,1437	Normal

The normality test of the data for each sample in Table 3 is $L_{count} < L_{table}$ at a significance level of 0.05. Thus, it may be argued that the distributions of the two samples are normal.

Before evaluating the data, the researcher ensured the homogeneity of the two sample groups (audiovisual class and charta class). This examination is conducted utilizing the homogeneity test. The findings of the homogeneity test for the research data in Table 4.

Table 4. Research data homogeneity test results.

No.	Data Variance	Research Sample		F_{count}	F_{table}	Interpretation
		Audiovisual	Charta			
1.	Pre-test	95,64	68,05	1,405	1,664	Homogeneous
2.	Post-test	81,90	87,60	1,069	1,664	Homogeneous

In the table 4, the homogeneity test was performed on each sample. According to the findings of the calculations, the F_{count} for the pre-test is 1,405, and the F_{count} for the post-test is 1,069. At the significance level of 0.05, interpolation reveals that F_{count} is greater than F_{table} for pre-test and post-test data. Thus, at a significance level of = 0.05, it may be argued that the two learning outcomes of the audiovisual class and the charta class have the same variance, or are declared homogenous.

Based on the findings of the computation of the data requirements test, it may be determined that the research data has been deemed normal and homogenous, hence meeting the criteria for hypothesis testing.

It is known that the two samples have the same or homogenous variance and are normally distributed. Consequently, hypothesis testing is conducted using a two-sample t-test. The data utilized to evaluate hypotheses is the final (post) examination of student learning.

The results of hypothesis testing based on attachment 16 yielded t_{count} = 2.73, but the distribution list t with dk = 74 and a significance threshold of 5% (= 0.05) yielded t_{table} = 1.99 by interpolation, therefore $t_{count} > t_{table}$ (2.73 > 1.99). According to the test requirements, H_0 is refused while H_a is approved if $t_{count} > t_{table}$. Thus, it can be inferred that there is a substantial difference between the learning results of seventh-grade SMP Negeri 2 Babalan students who used audiovisual media and those who used chart medium to learn about ecosystems.

After examining the data in the form of a normality test using the Liliefors test, it is known that both the audiovisual class and the charta class include regularly distributed data. For the homogeneity test utilizing the F test, it is known that the variances of the pre-test and post-test data for both groups are identical (homogeneous).

Based on the results of hypothesis testing using the t-test, it was determined that there was a significant difference between the learning outcomes of seventh-grade SMP Negeri 2 Babalan students who were taught using audiovisual media and those who were taught using chart media for learning ecosystem materials. This study's findings are comparable to those of Cahyono et al. (2021), Khumaedi et al. (2021), Maryanti & Kurniawan (2017), Sumarsono & Anisah (2019), and Alshatri et al. (2019), which indicate that audio-visual media may increase student learning outcomes. Mathew et al. (2013) explained that audio-visual as a teaching approach was capable of stimulating thought and enhancing the learning environment of Aljouf University students.

This demonstrates that the use of audiovisual media in learning activities is superior than the use of chart media. The difference in learning results may be attributed to the utilization of audiovisual learning resources. With audiovisual media, pupils will learn more than if the subject matter were provided just via visual or aural stimuli. The use of audiovisual media encourages students to be constantly engaged in learning by

engaging in a variety of activities to properly comprehend the lesson content. Because the use of audiovisual media in the classroom allows pupils to study at their own speed.

This is evident from the students' enthusiastic and engaged participation in biology classes. After comprehending and comprehending the information offered in audiovisual medium, all students study their individual course materials. If a student does not comprehend, he or she promptly asks the instructor for clarification, giving the instructor additional time and opportunity to give individualized assistance to each student who needs it. Compared to pupils who are taught via chart media, their educational achievements are worse. This occurs when the media chart seems to be concentrated on the instructor, since the teacher explains more, causing pupils to get bored more quickly, which has an effect on their lack of interest and desire in attending classes (Retno 2010).

Students who are taught using audiovisual media are more enthusiastic since the lesson becomes more engaging and instructive. By acquiring more authentic material, pupils may strengthen their cognitive abilities. The instructor gives the lesson while using chart media, and the pupils listen attentively before copying the information into their separate notebooks. When there are queries or questions that the instructor throws at the students, only clever students are able to respond or work on them, while others who do not comprehend remain mute and wait for replies from other students or for the teacher to write answers on the blackboard (Yuniyatul 2013).

The greater learning results of students in the audiovisual class cannot be isolated from the activities they engage in, since good learning requires physical and psychological activities of all types. Psychological activities include thinking and bodily actions including doing. According to J. Piaget's statement in Retno (2010), a youngster thinks as long as he acts. Without action, a youngster cannot think. For him to think independently (actively), he must be provided the chance to do so on his own.

Teaching and learning activities will be more successful and simpler if visual aids are used, since just 11% of what is learnt is through the sense of hearing, while 83% is through the sense of sight. Additionally, it was believed that we can recall just 20% of what we hear, but 50% of what we see and hear (Rusman 2013).

The usage of audiovisual media or what is often known as video has a tremendous potential for conveying messages and attracting the interest and attention of pupils. It has been shown that video media may effectively (more than 70 percent penetration) communicate information, entertainment, and education. Consequently, learning video media is one of the most effective and efficient learning medium for obtaining competency or learning goals. In other words, instructional video media is a video program that is created, utilized, and intended to meet learning goals (Warsita, 2008).

To enhance the effectiveness and efficiency of learning via the use of audiovisual media, it is necessary to consider the following: The instructor is continually attentive to the learning environment so that pupils can effectively follow the lesson. The

instructor pays careful attention to the distribution of instructional movies so that she may also explain the subject matter. Therefore, the media's function as a teaching and learning medium is improving. This result is consistent with the findings of Karlina & Setiyadi's (2019) study, which indicate that students seem more willing to participate in scientific courses, particularly when requested to view audio-visual learning resources. Mutia et al. (2020) added audio-visual media to a blog in a separate research; as a consequence, the use of audio-visual media aids may boost students' interest in learning. Improved learning results might result from a student's improved motivation to study (Erwiza et al., 2019).

According to the findings of the research, there is a substantial difference between the learning outcomes of students who are taught using audiovisual media and those who are taught through chart media in class VII State Junior High School 2 Babalan learning ecosystem resources. The findings of this research also indicate that using audiovisual material into teaching and learning may increase student learning outcomes.

CONCLUSION

The average value for the biology learning outcomes of seventh-grade SMP Negeri 2 Babalan students who are taught ecosystem topics via audiovisual learning media is 79.26. The average value for the biology learning outcomes of seventh-grade SMP Negeri 2 Babalan students who are taught ecosystem topics through chart learning media is 73.47. The results of the average value and standard deviation (SD) of the post-test data, namely the average audiovisual class, demonstrate that there is a significant difference between the learning outcomes of class VII SMP Negeri 2 Babalan students using audiovisual media and chart media for ecosystem materials. The conclusion of this research showed that the use of audiovisual learning media by junior high school teachers to teach ecological content was better than the use of charta media.

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