THE EFFECT OF AUDIO-VISUAL LEARNING MEDIA IN SCIENCE ON STUDENTS' CRITICAL THINKING ABILITY

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Abstract. The purpose of this research is to examine the influence of implementing audio-visual learning media in the subject of human circulatory system on the critical thinking ability of fifth-grade students at SDN 060856 Medan. This study falls under the category of quantitative research with a Quasi-Experimental Design, specifically the Non-Equivalent Control Group Design. The population for this research comprises 48 fifth-grade students at SDN Medan. The samples selected are from Class V-A as the experimental group and Class V-B as the control group. The data analysis utilized the t-test, processed using SPSS 24 software, with a obtained significance value (2-tailed) of < 0.003 for the experimental group < 0.05. As a result, it can be concluded that there is a significant influence on Class V-A, which applied audio-visual learning media, particularly in improving the critical thinking skills of fifth-grade students at SDN 060856 Medan.

Keywords: Audio-visual media; Critical Thinking Ability; Science Learning.

I. INTRODUCTION

Students must be able to think in order to develop, compete in the rapidly evolving world, and tackle everyday life problems in 21st-century learning. Enhancing individual talents in the form of critical thinking is one of the thinking abilities that students must be prepared for and possess. Huitt emphasizes that critical thinking is a crucial skill for achieving success in the 21st century. According to Lipman, critical thinking is a cognitive ability that can be used to consider the best actions [2]. Ozdemir defines critical thinking as the intellectual or mental ability of an individual to examine facts or knowledge, attempt to explain what they read or hear before accepting someone else's ideas or claims, ask them to support their claims using various grounds, make them consistent and highly integrated individuals, and use various criteria when making decisions about something. Seis states that by utilizing students' intelligence to draw conclusions, critical thinking is a process of intelligent and responsible thinking that involves looking at situations from all angles and conducting research to find the best perspectives, considerations, or judgments [3].

According to Surip, critical thinking is one of the high-level skills that have a positive impact on one's life in achieving aspirations and hopes, where this ability is crucial for every human being [3]. Those who can think critically can analyze and evaluate every new information they receive. Students with high critical thinking abilities in receiving information can review it and choose information based on their existing knowledge.

The ability of students' critical thinking can be assessed from their ability to critically analyze problems in the form of asking "why" questions, offering solutions that have not been thought of by others, expressing opinions using comparisons and contrasts, identifying unconventional problem-solving techniques, and explaining changes in detail [3]. Jhonson states that decision-making, problem-solving, conducting scientific research, and evaluating assumptions are examples of cognitive processes clearly described in the critical thinking process.

Video recordings, audio slides, and other types of audio-visual media combine sound with visual images that can be widely seen to create a content known as audio-visual media [5]. According to Katoningsih, audio-visual media is a medium used to convey knowledge through the senses of hearing and sight during learning activities [6]. Here, students can inspect and witness the actual combination of colors, sounds, and images. This aligns with Rinanto's perspective [1982], which claims that students can see, hear, observe, and reflect on significant, real, and realistic ideas when using audio-visual media.

Fitria mentions several benefits of audio-visual media, including: 1) the ability to be played anytime and anywhere, 2) the ability to be used collaboratively (all students can see and hear simultaneously), 3) the ability to present a combination of sound and images simultaneously, thus captivating students' attention, 4) the ability to be accelerated and decelerated, 5) the ability to present depictions of events that students cannot experience directly (such as natural disasters, the depiction of the universe, and others), 6) and the ability to be used and replayed repeatedly [6]. According to Dyah et al.'s research [2018], students who participated in problem-based learning with a scientific approach and audio-visual aids obtained an average score of 76.32, categorized as "Very High." This indicates that the audio-visual media used in the learning process can enhance every aspect of critical thinking.

In the teaching-learning process, instructional media are of utmost importance. Nowadays, educators must employ

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teaching strategies that foster students' critical thinking abilities. The use of audiovisual materials for elementary school children is one of the media that can be utilized to enhance students' critical thinking abilities. Based on preliminary findings from observations conducted in the VI grade of SDN 060856 Medan, there were obstacles during the learning process in the class. One of the hindrances is that many students cannot think critically due to a lack of interest when learning in the classroom. Some students find learning about the human circulatory system boring, leading to their difficulty in thinking critically. This can be observed from their answers and the way students respond to the given instruments. It is crucial for teachers and schools to assess students' critical thinking and the methods used by teachers to teach, as well as the efforts and solutions that can be employed to address students who have difficulty thinking critically about the circulatory system in grade V at SDN 060856 Medan.

Based on these issues, the researchers are interested in conducting a study to enhance students' critical thinking abilities based on these concerns. Implementing the use of audio-visual media in elementary schools is one approach to achieve this. It is hoped that using this media can aid students in developing their critical thinking abilities. Thus, based on the background, the title "The Influence of Audio-Visual Media in Science Learning on Students' Critical Thinking Abilities" is chosen.

II. RESEARCH METHODS

This research adopts a quantitative approach with a Quasi-Experiment research method. The use of this quantitative approach aims to obtain data from the field conducted at SDN 060856 Medan, Grade V, and to understand the influence between independent variables (X) and dependent variables (Y) (Kristanto, 2018). The Quasi-Experiment Design utilized in this study is the Non Equivalent Control Group Design. According to Sugiyono, the experimental method is a research technique used to determine the impact of combining specific therapy with standard treatment under carefully controlled conditions [7].

The research was conducted at SDN 060856, located at Jl. Rakyat Lor. Gereja No. 30, Kec. Medan Perjuangan. The participants in this study are students from Grade V. The sample used comprises Class V-A and Class V-B, and the Sampling Jenuh technique is employed to identify the experimental and control groups as research subjects. The sample is divided into two groups: the experimental class in Class V-A, which receives specific instructions in scientific learning using audio-visual media, and the control class in Class V-B, which is taught traditionally with a heavier emphasis on lectures, discussions, and presentations. Each group consists of 14 students, making a total of 28 students as the sample.

In this study, observation, tests, and documentation are used as data collection methods. Test sheets and observation sheets are used to assess students' critical thinking abilities before and after learning and during the learning process and class discussions. The test method includes pre-test and post-test assessment sheets given to students so that researchers can observe and compare students' critical thinking abilities before and after the application of specific treatments. The indicators proposed by Ennis to measure critical thinking abilities include elementary clarification, basic support, inference, advanced clarification, and organizing strategies and tactics.

Normality tests, homogeneity tests, and hypothesis testing are data analysis techniques used in this research. To conduct these tests, the researcher utilizes SPSS 24. The normality test aims to determine whether the data is normally distributed or not, using the Shapiro-Wilk formula. The homogeneity test is employed to determine whether the data varies homogeneously or not, using the T-test formula. Hypothesis testing uses the T-test formula to evaluate the difference between the average post-test scores of the two groups.

III. RESULTS AND DISCUSSION

A. *Normality Test*

The purpose of analyzing the normality of the research data is to determine whether the independent variable (X) and dependent variable (Y) in the regression equation produced follow a normal distribution or not. To assess whether the data to be examined is normally distributed, a normality test needs to be conducted. If the data is normally distributed, hypothesis testing can be carried out. As the sample size or number of students is less than 100, the researcher selected 28 students from the experimental and control groups as the sample for the normality test using the Shapiro-Wilk analysis technique. The data was calculated using SPSS (Statistical Product and Service Solution) version 24, with the following criteria:

1) The data is considered to be normally distributed if the significance value (sig) > 0.05.
2) If the research data is not normally distributed, the significance value (sig) is <0.05.

Table 1. Normality Test Results for Students' Critical Thinking Ability

Variable	Test	Statistic	Df	Sig.
Students' Critical Thinking	Pre-Test (Experiment)	0.184	14	0.200*
Ability	Post-Test (Experiment)	0.214	14	0.081
	Pre-Test (Control)	0.227	14	0.049
	Post-Test (Control)	0.185	14	0.200*

Based on the Shapiro-Wilk test results, the data is considered normal as the significance values for the pre-test in the experimental group are 0.301 (> 0.05) and for the post-test in the experimental group are 0.910 (> 0.05). The data also follows a normal distribution for the pre-test in the control group (significance value of 0.061 > 0.05) and for the post-test in the control group (significance value of 0.377 > 0.05). After confirming that the data is normally distributed, the homogeneity test was conducted.

B. *Homogeneity Test*

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This test is conducted to assess the extent of variance comparison between each group of data and other groups. The results are shown in the table below based on the Pretest-Posttest outcomes in the experimental and control classes:

Table 2. Test of Homogeneity of Variance

Test Type	Levene Statistic	df1	df2	Sig.
Critical Thinking Skills (Mean)	4.984	3	52	0.094
Critical Thinking Skills (Median)	3.099	3	52	0.035
Critical Thinking Skills (Median with adjusted df)	3.099	3	43.646	0.036
Critical Thinking Skills (Trimmed Mean)	4.825	3	52	0.005

The basis for decision-making in the homogeneity test is as follows:

1. If the significance value (sig) Based on Mean > 0.05, then the data variances are homogeneous.
2. If the significance value (sig) Based on Mean < 0.05, then the data variances are not homogeneous. Based on the data obtained from the previous section, it can be concluded that the variances of the post-test experiment group and post-test control group are equal or homogeneous because the significance value (sig).

Based on Mean is 0.94 > 0.05. Once the data is confirmed to be normal and homogeneous, hypothesis testing can be conducted. SPSS version 24 was used to perform the hypothesis test using the t-test. The findings from the pretest-posttest hypothesis test (t-test) are as follows:

C. Hypothesis Testing

In order to determine whether the post-test results of the experimental group and the post-test results of the control group differ, a hypothesis testing was conducted using the Independent Sample T-test with SPSS Version 24 software. The following formula was used in this hypothesis testing:

Ho: There is no significant influence of using audio-visual media on students' critical thinking ability.

Ha: There is a significant influence of using audio-visual media on students' critical thinking ability.

The decision basis for the Independent Sample T-test significance (2-tailed) is as follows:

1) If the significance value (2-tailed) < 0.05, then Ho is rejected and Ha is accepted.
2) If the significance value (2-tailed) > 0.05, then Ho is accepted and Ha is rejected.

The results of the hypothesis testing calculations can be seen in the following table:

Table 3. Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means
	F	Sig.
Critical Thinking Ability of Students	Equal variances assumed	4.552
	Equal variances not assumed	

The table above is used to determine the significance value (sig). Conclusion: There is a difference in the average critical thinking ability of students between the lecture technique (traditional) and audio visual learning media (2-tailed 0.003 < 0.05).

The following statistical table shows the mean values of the post-test for the experimental group and the control group for further information:

Table 4. Group Statistics

	Class	N	Mean	Standard Deviation	Standard Error Mean
Critical Thinking Ability of Students	Post-Test Experiment	14	90,00	7,845	2,097
	Post-Test Control	14	76,07	13,613	3,638

The results of the post-test for the experimental group clearly indicate that the average score of the experimental group is higher than that of the control group. The difference between the mean scores of the experimental group (90.00) and the control group (76.07) indicates that the audio-visual learning approach influences students' critical thinking ability.

The use of audio-visual media, which presents information in both visual and auditory forms, engages the students' senses of sight and hearing, making it a highly captivating medium. Students not only need to hear what is being taught but also see and experience it firsthand through audio-visual materials. The use of audio-visual materials assists students in better understanding concepts related to the human circulatory system. By utilizing audio-visual materials, students can easily grasp how the human circulatory system functions visually. It helps educators focus students' attention on the information they will learn.

Considering the circumstances that require educators to use educational media as an aid in the teaching and learning process, accommodating students' learning preferences is essential. According to Nasution (2008), learning style refers to how individuals prefer to absorb stimuli or information, solve problems, recall, and think continuously. Ryanto (2009) further categorized learning styles into: (1) visual learning style, which involves learning through seeing, observing, and performing similar activities, (2) auditory learning approach, which places a strong emphasis on hearing, and (3) kinesthetic learning style, which tends to learn through touch and movement. Based on these statements, since researchers often employ audio-visual materials, the visual learning style is the most suitable. When compared to the traditional approach, the use of audio-visual materials is more effective in ensuring that students can retain and comprehend the taught information. This indicates that children learn best through visual means.

The elementary school years (ages 7-12) are known as the concrete operational phase in Piaget's theory. Students are particularly drawn to clear and inventive images during this stage. Students in this phase, who are in the concrete operational period, learn lessons through media and/or devices that activate their hearing and vision more quickly. Learning

is enhanced by how well the senses are engaged during the concrete operational phase. The use of appropriate media, especially audio-visual media, in the learning process is necessary to adequately involve those senses. This is because the use of audio-visual media helps students enhance their cognition by seeing, listening, and comprehending.

In order for students to absorb the lesson well when using audio-visual learning materials, instructors provide additional guidance and act as facilitators of learning. Compared to students receiving traditional instruction, students receiving instruction on critical thinking using audio-visual learning tools show stronger critical thinking skills in learning science. This indicates that the use of audio-visual learning resources yields more effective outcomes than traditional teaching methods.

As students are required to concentrate on both auditory and visual senses simultaneously, their response to instructors presenting materials using audio-visual media is favorable. As a result, more students easily understand the subject matter compared to those who do not. Students are encouraged to approach issues in their surroundings with an open mind through the development of critical thinking skills. Here, audio-visual media is used as a tool to assist students in problem analysis, making it easier for them to arrive at solutions.

As seen in Table 3 above, there is a correlation between the use of audio-visual media and students' critical thinking abilities, with a 2-tailed significance value of 0.003 < 0.05 and 95% confidence level, making the data significant. The use of audio-visual media impacts students' critical thinking abilities, and the critical thinking ability of the experimental group is better than that of the control group after the treatment, in line with the supporting hypothesis (Ha). This indicates that there is a difference in the average level of students' cognitive abilities between the two sample groups, where the experimental group in SDN 060856 Medan exhibits higher critical thinking abilities compared to the control group.

The findings of this research support Vera's study (2018), which found that the use of PBL model with audio-visual support can enhance students' critical thinking abilities. Additionally, the results of a study by [3] found that the use of audio-visual learning approaches combined with cooperative learning has a significant impact on students' critical thinking abilities. Implementing learning through audio-visual media in this manner helps students understand science subjects explained by instructors and positively affects their critical thinking abilities. Teachers can help students better understand events or natural phenomena they cannot experience directly by using audio-visual aids. Compared to learning through audio-visual media, conventional teaching models that use a lecture-based approach still do not provide students with the opportunity to enhance their creativity and knowledge. This is despite the fact that this teaching model motivates students to some extent.

IV. CONCLUSIONS

Based on the data processing, analysis, and hypothesis testing, it was found that Class V-A, the experimental group, obtained a post-test result with an average score of 90.00, while Class V-B, the control group, obtained a post-test result with an average score of 76.07. The t-test calculation for the post-test indicated a 2-tailed significance value of 0.003 < 0.05 with a 95% confidence level, making the data significant. The critical thinking ability of students in the experimental group, using audio-visual learning materials, was better than that of the control group, which used traditional lecture techniques. The researchers draw the following conclusions: 1) There is a significant impact of audio-visual media on students' critical thinking ability regarding the human circulatory system material; and 2) After the treatment at SD Negeri 060856 Medan, the critical thinking ability of students in the experimental group is better than that of students in the control group.

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