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THE INFLUENCE OF THE GROUP INVESTIGATION MODEL ASSISTED BY MEDIA PUZZLES ON STUDENTS' UNDERSTANDING OF SCIENCE CONCEPTS

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Abstract: This research is based on students' misconceptions about science subjects, especially animal life cycle materials. This study aimed to find significant differences after applying the puzzle media-assisted group investigation model to students' understanding of science concepts. This research is a quantitative research experiment with a group pretest-posttest design. The sample used was grade V students of SDN 2 Wonosemi, consisting of 12 students. The sampling technique used is random sampling. The data collection method used is the test method. The instruments used are pretest and posttest questions of multiple choice understanding of student concepts consisting of 20 questions. The normality test is an initial test that shows normally distributed data. This study used an average difference test with a statistical test, namely the Paired Sample T-test. The t-test results showed that the average pretest score was 59.17 while the average posttest score was 82.92 with Sig. (2-tailed) = 0.00 < 0.05. According to the criteria used in the Paired Sample T-Test, H_a is accepted, and H_0 is rejected. So, a significant difference exists between pretest and posttest scores using a group investigation model assisted by puzzle media on students' understanding of science concepts. Applying the group investigation model assisted by puzzle media affects the understanding of students' science concepts.

Keywords: *Influence, Group Investigation, Puzzles, Understanding, Science Concept*

INTRODUCTION

Education is an environment that shapes the order of life. Education is one of the efforts used in preparing human resources that have high competitiveness [1]. Law Number 20 of 2003 concerning the National Education System explains that education is a place to develop all the potential that exists in every human being. Learning activities must run effectively, efficiently, and enjoyably to realize educational goals. Education is a conscious activity that is planned and aims to create learning activities and learning processes that can actively develop students' potential in religious and spiritual strength, emotional control, character, noble morals, and skills [2]. Learning activities are a process that takes place from birth to the end of life in all fields of science. Learning is good if students can learn through direct experience [3]. Students take an active role during learning activities so that student learning outcomes are as expected [4]. The achievement of good learning outcomes by students is supported by the ability of students to understand the learning material.

Learning strategies used by teachers can affect student success in understanding learning material. Learning strategies are the way to deliver material to create student learning experiences [5]. When students are given more opportunities to participate in learning activities actively, it can make them understand the material more optimally. It follows the group investigation learning model, which is a cooperative learning model that involves students actively. The Group Investigation model is a learning model that adheres to constructivism and cooperativeism [6]. Learning occurs in how students discover their own knowledge by identifying sub-subtopics acquired during group work. So, this model allows students to participate in learning activities from the beginning to the end of the evaluation. There is also an intermediary or learning media that can improve students' understanding of concepts. Learning media are all things that can be used to explain material and develop students' thinking skills [7]. Media is a tool used during the learning process so that the message to be conveyed can be conveyed clearly [8]. So, in this study, a media is needed that can be applied in conveying students' understanding of science concepts. The media used in this study is puzzle media. A puzzle is a game in the form of pieces of pictures that must be arranged into a complete pattern [9]. Puzzle media can sharpen students' brains in thinking critically and creatively, training accuracy and patience.

Learning activities continue to grow with various models, methods, media, and teaching materials used to facilitate students during learning. During learning activities, teachers must also behave as communicators who provide learning instructions to communicants, namely students [10]. One of the efforts to improve the ability of teachers to organize learning activities is to use various learning resources and media [11]. During the COVID-19 pandemic, learning activities were carried out online through IT-based learning media. In applying IT-based media, some obstacles become obstacles for teachers [12]. In addition, it is feared that students cannot be separated from the use of smartphones or other sophisticated tools. Current learning activities are still characterized

by the dominant role of teachers and the number of students who only memorize material and do not understand learning concepts [13]. So, success in achieving educational goals has yet to be achieved optimally. It is also the same as learning on theme 5, Ecosystem.

Based on the observations that researchers made to teachers and grade V students of SDN 2 Wonosemi, researchers found that some students had difficulty understanding the process of animal life cycles. The teacher applied the learning model during the lesson but still needs to succeed fully. The use of learning media in the learning process still needs to be improved. Therefore, the learning outcomes of science content still need to meet the minimum completeness criteria fully. It can be seen from the results of students' daily tests there are 4 out of 12 students who achieve minimum completeness criteria scores. Students who get scores above minimum completeness criteria are only 33% when presented. In addition, teachers sometimes need help to divide groups and achieve predetermined material delivery targets. During discussion activities, only one to two students are usually active during learning activities, while others are only busy playing. Learning activities also tend to be textual, making books the primary source of learning.

It is necessary to apply the Group Investigation model assisted by puzzle learning media to test whether it can improve students' understanding of science concepts, especially in animal life cycle materials. Group Investigation learning assisted by puzzle learning media can be used as a solution to existing problems because this learning is able to encourage students' ability to think, analyze, and involve students actively during learning from the beginning to the end of learning. This research is supported by previous research that the application of the Group Investigation model significantly affects understanding the concepts and critical thinking skills of science [14]. In addition, a study conducted explained that the use of puzzle media is feasible to use for learning media. To make it easier for students to remember the learning concepts that have been learned [15].

Based on the background of this problem, researchers and grade V teachers of SDN 2 Wonosemi tried to use the group investigation learning model assisted by puzzle learning media to improve students' understanding of science concepts. This effort was realized with a Quantitative Research Experiment entitled "The Effect of Group Investigation Model Assisted by Media Puzzle on the Understanding of Concepts of Class V Students." This study aimed to find significant differences after applying the puzzle media-assisted group investigation model to students' understanding of science concepts.

RESEARCH METHODS

This experimental quantitative research uses the Group Pretest-Posttest Design research design. This design will compare the pretest results before treatment with the posttest results after treatment so that the results are more accurate [16]. In this study, only experimental classes were treated using a group investigation model assisted by puzzle media. The independent variable in this study is a group investigation model assisted by puzzle media. The dependent variable is the understanding of students' science concepts. Here is an overview of One Group Pretest-Posttest Design [17].

$$O_1 \times O_2$$

Information :
× : Treatment provided
O_1 : Pretest scores (before treatment)
O_2 : Posttest scores (after treatment)

Participant

The population used in this assessment is grade V students of SDN 2 Wonosemi for the 2023/2024 academic year. The sample selection technique in this study is random sampling because the respondents who were sampled in this study were all grade V students, totaling 12 students. It consists of 4 female students and eight male students.

Instrument

The instruments used in the test method are pretest and posttest question sheets of multiple choice understanding of student concepts consisting of 20 questions. The test instrument contains seven indicators of concept understanding. The indicators of understanding the concepts used in this study are following the opinions of interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining [18].

Data Collection

The data collection method used is the test method. Then, the data was tested for normality (Shapiro-Wilk test) because the number of samples used was smaller than 50 [19]. Based on the pretest and posttest data analysis, a sig result of > 0.05 was obtained with pretest data of 0.904 > 0.05 and posttest data of 0.062 > 0.05 at a significant level of 0.05 and N = 12, then H0 was accepted. So, from the results of the pretest data, it was obtained that the results of the initial data understanding the concept of students before being given the treatment of the group investigation model assisted by normally distributed puzzle media. Likewise, the results of the posttest data obtained the final results of students' concept understanding after being given the treatment of the group investigation model assisted by normally distributed butterfly puzzle media. The data is declared normally distributed because the table above

shows significant results of 0.904 and 0.062, which means the data exceeds 0.05.

Data Analysis

Data analysis was carried out to determine whether there was a difference in the average pretest and posttest scores of students' understanding of science concepts. The hypothesis proposed is as follows.

H_0 : There was no significant difference in pretest and posttest results after applying the puzzle media-assisted group investigation model to the understanding of science concepts of grade V students.

H_a : There are significant differences in pretest and posttest results after applying the puzzle media-assisted group investigation model to the understanding of science concepts of grade V students.

The average difference test was performed using the statistical test Paired Sample T-Test. The condition of taking the hypothesis is that if the significance value is $> \alpha = 0.05$, then H_0 accepted H_a is rejected. If the significance value is $\leq \alpha = 0.05$, then H_0 rejected H_a is accepted.

RESULTS AND DISCUSSION

This study was conducted in July 2023 and lasted one week by providing three treatments. The learning process uses a group investigation model assisted by puzzle media. The sample used is grade V students at SDN 2 Wonosemi for the 2023/2024 school year. The number of samples consisted of 8 male and 4 female students, adding up to 12 student samples in this study.

Table 1. List of class V students of SDN 2 Wonosemi

Class	Man	Woman	Sum
V	8	4	12

The study was conducted with the theme Ecosystem on the subtheme of Ecosystem Components, which focuses on animal life cycle material. Briefly, the stages in the study are divided into three stages. The first is the pre-experiment stage, where researchers give pretest questions before students are given treatment. The second is an experiment where researchers provide treatment in experimental classes by applying group investigation models assisted by puzzle media to understand the concept of animal life cycle material. The last is the post-experiment stage, where researchers provide a posttest or final test, which is used to find out how much influence the treatment has on the experiment. The following is a learning using a group investigation model assisted by puzzle media, as seen in the following picture.

Figure 1. Learning using a group investigation model assisted by puzzle media

Applying the group investigation learning model with puzzle media significantly differentiates pretest and posttest scores. The average score of the posttest (after treatment) is higher than that of the pretest (before treatment). It is due to treatment that can hone students' concept-understanding skills. During learning activities, students listen to teachers' explanations and actively carry out the learning process. When doing assignments in groups, each student carries out work together and carries out each of their responsibilities. It is in line with research that states that the group investigation model has a significant influence compared to conventional models in science learning [20].

This study not only uses a group investigation model but also features the use of appropriate media, namely butterfly puzzles. Butterfly Puzzle Media is a disassembly game that contains pictures of the life cycle process of butterflies. This butterfly puzzle focuses on educating children in learning materials for the perfect metamorphosis of science content in grade V Elementary School. So, butterfly puzzles are very effective and can train students' concentration and accuracy. Following the opinion that the advantages of puzzle media include training concentration, accuracy, patience, and strengthening students' memory [21]. The puzzle media used in this study can be seen in the following figure.

Figure 1. Picture of butterfly puzzle media

During learning activities, students are very enthusiastic when playing puzzle media; this is shown when students are very enthusiastic about compiling butterfly puzzle media during learning activities. Following research, the puzzle media-assisted discussion method significantly affects student

learning outcomes [22]. In addition, using media during learning activities, students can concretely relate existing learning material to life [23]. The results of students' understanding of concepts are known through pretest and posttest results. The results of the recapitulation of students' concept understanding are shown in the following table.

Table 2. Science concept comprehension score

Component	Concept Comprehension Score	
	Pretest	Posttest
Average	59.17	82.92
Highest	85	25
Lowest	100	75

Based on Table 2, there is a significant effect on increasing students' understanding of concepts. Through the results of understanding the concept of the material of the process of perfect metamorphosis, students have an average score of 59.17, with the highest score of 85 and the lowest score of 25. At the same time, the posttest score has an average score of 82.92, with the highest score of 100 and the lowest score of 75. So, there is a significant difference between the average pretest score of 59.17 and the average posttest score of 82.92. Then, the data is collected through a paired sample t-test, calculated using the SPSS 26 for Windows application in the following table.

Table 3. Paired Sample T-Test Results

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	Pretest - Posttest	-23.750	12.636	3.648	-31.778	-15.722	-6.511	11	.000

Source: Pretest and posttest value data processed using the SPSS application

Through Table 3, it is known that the value of Sig. (2-tailed) = 0.000 < 0.05. The criteria used in the paired sample t-test is the Sig. p value < 0.05 then H_a is accepted and H_0 is rejected. So, there is a significant difference between pretest and posttest scores using a group investigation model assisted by puzzle media on the understanding of the concepts of class students. It is in line with the results of research that in improving student learning outcomes, teachers need an innovative media and learning model to foster student enthusiasm and activeness in participating in direct learning [24].

CONCLUSION

Based on the results of the t-test, it shows a Sig. (2-tailed) value of 0.000 < 0.05 so that H_a is accepted and H_0 is rejected. So, there is a significant difference between pretest and posttest scores using a group investigation model assisted by puzzle media on understanding the concepts of grade V students. Therefore, group investigation models and puzzle media are appropriate for improving students' understanding of concepts. These models and media can make it easier for students to understand the concept of learning material and create student interaction in the learning process as a follow-up activity to expand the ability to understand student concepts.

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