Indonesian Journal of Science and Education
Volume 08, Nomor 01, 2024, pp: 57-64
p-ISSN:2598 –5205, e-ISSN: 2598-520, DOI: 10.31002/ijose.v8i1.1446
e-mail: ijose@untidar.ac.id, website: https://journal.untidar.ac.id/index.php/ijose/index

IMPLEMENTATION OF ARGUMENT DRIVEN INQUIRY INSTRUCTIONAL MODEL TO IMPROVE COGNITIVE LEARNING OUTCOMES

Aza Mazita[1], Siswanto[2*], Suwito Singgih[3], Nuryunita Dewantari[4], Djoko Sri Bimo[5]
[1,2,3,4]Universitas Tidar
[5]Universitas Terbuka
e-mail: siswanto@untidar.ac.id

Received: March, 4th 2023 *Revised: March, 26th 2024* *Accepted: April, 20ht 2024*

ABSTRACT

Cognitive learning outcomes are important basic skills that students must master, so science learning must be designed so that it can optimally provide students with the cognitive dimension. The importance of cognitive learning outcomes is in contrast to conditions in the field. Students' cognitive abilities in science learning are still low, especially at levels C2, C3 and C4. Observation results at Ihsanul Fikri Mungkid IT Middle School show that students' cognitive learning outcomes are still below the specified average, namely 78. The aim of this research is to analyze the effectiveness of learning using the Argument Driven Inquiry model in improving junior high school students' cognitive learning outcomes. This research uses a quantitative approach of the Quasi Experiment type, data analysis is carried out using the Mann Whitney test, N-Gain test, and effect size test. The research results show that the Argument Driven Inquiry (ADI) learning model is effective in improving the cognitive learning outcomes of junior high school students with an N-Gain of 0,7444, which is in the high category..

Key words: Argument Driven Inquiry, Cognitive Learning Outcomes

INTRODUCTION

An important aspect in the learning process is cognitive learning outcomes. Anderson and Krathwohl (2001) explained that cognitive learning outcomes are the achievement of mastery related to students' intellectual activities from basic to higher levels and focuses on students' thinking abilities. Cognitive learning outcomes are the main priority and very important for students to master (Siswanto et al., 2022). In line with this, Howard (2015) stated, Cognitive learning outcomes are important basic skills that students must master so that science learning must be designed so that it can optimally provide students with cognitive dimensions.

The importance of cognitive learning outcomes is in contrast to conditions in the field. Based on literature studies related to cognitive learning outcomes, the results of Siswanto's (2014) research in several junior high schools show that students' cognitive abilities in science learning are still low, especially at levels C2, C3 and C4. Research by Anggraeni and Siswanto (2019) reports that in general the average score of students in science learning is still below the KKM. A similar thing was also found by Hadiwidodo et al (2017), that the learning outcomes of secondary school students were still relatively low where the percentage of the class that had not reached the KKM was 60%. Cognitive learning outcomes are low because students have not mastered science learning completely. The science learning process does not only focus on products but also focuses on processes (Anggraeni & Siswanto, 2019).

The results of observations on science learning activities at SMP IT Ihsanul Fikri Mungkid in September 2023 show that in learning practice teachers tend to apply the lecture method of learning so that learning is less active and students are still stuck with textbooks. Learning activities that are still teacher-centered cause students to not be able to build and discover their insights independently. The lack of students' active role in learning will influence the achievement of learning outcomes that are not optimal. This is shown in the cognitive learning outcomes for class IX science subjects with an average daily score of 75.6, which is still below the specified KKM, namely 78.

Based on several existing problems, the solution to handle these problems is to apply the Argument Driven Inquiry (ADI) learning model. Mutiah and Ulfa (2022) explained that the Argument Driven Inquiry (ADI) learning model has been designed so that students have the opportunity to develop their abilities when collecting data, conducting research, answering research questions using data, writing and thinking critically. In line with this, research by Hadiwidodo et al (2017) states that the use of the Argument Driven Inquiry (ADI) learning model can improve students' abilities in arguing and learning outcomes.

The Argument Driven Inquiry learning model can encourage students to take control of their own learning. Through discussions and writing arguments, students provide the opportunity to learn how to propose, analyze, and modify ideas (Sampson et al., 2010). The steps in the Argument Driven Inquiry model involve more student activity because students must develop their own ways of collecting and analyzing data, producing tentative arguments, presenting their arguments to other groups, compiling investigative reports, reviewing other groups' reports, and revising their reports. Meanwhile, teachers are responsible for presenting problems to students and accompanying them during the learning process (Patmi, 2018).

According to Sampson (2010), the Argument Driven Inquiry (ADI) learning model is important to use because it is combined with argumentation activities that help students make scientific explanations, generalize scientific facts, answer research questions using data, and reflect on the results of research. The Argument Driven Inquiry (ADI) learning model helps students actively learn, trains cooperation between friends in groups, trains students to

dare to express opinions, develops self-confidence, and provides learning experiences to improve, improving argumentation skills and learning outcomes, especially in the cognitive domain (Pratiwi , 2022).

Based on the description above, the aim of this research is to analyze the effectiveness of learning using the Argument Driven Inquiry model in improving the cognitive learning outcomes of junior high school students.

METHOD

This research used a quantitative approach of the Quasi Experiment type and was carried out on all class IX students at SMP IT Ihsanul Fikri Mungkid for the 2023/2024 academic year. Then two classes were chosen to be the sample, namely the experimental class and the control class. The sampling technique used is Non-Random Sampling, namely Purposive Sampling. The data collection technique applied was a pretest and posttest containing questions that could measure the cognitive learning outcomes of junior high school students. The cognitive learning outcomes test instrument consists of 10 multiple choice questions consisting of questions C1-C6. The cognitive learning outcome scores then converted on a scale of 0 to 100.

The data analysis technique used was a prerequisite test consisting of a normality test and a homogeneity test. After the prerequisite tests are fulfilled, the Mann Whitney test, N-Gain test and effect size test are carried out. Before data analysis is carried out, the cognitive learning outcomes test instrument is first tested for validity by experts and tested for reliability

The results of the validity test of cognitive learning outcomes show that the question instrument used is valid with a V value ≥ 0,8. The instrument is said to be reliable or consistent for use if the r value (Cronbach's Alpha) is more than 0,361 (Arikunto, 2010). The cognitive learning outcomes instrument with a significance level of 5% produced an r (Cronbach's Alpha) value of 0,517 > 0,361. So, it can be concluded that the cognitive learning outcomes test instrument is reliable or consistent with the sufficient category.

RESULT AND DISCUSSION

The test result data consists of pretest and posttest scores whose indicators have been adjusted to measure cognitive learning outcomes covering domains C1-C6. Pretest and posttest scores are converted on a scale of 0-100. The average results of the pretest and posttest cognitive learning outcomes are presented in the Table 1.

Table 1. Average Value of Cognitive Learning Outcomes

Average value	Experimental Class	Control Ckass
Pretest	24	26
Postest	81	45

The average posttest score for the experimental class after being treated using the Argument Driven Inquiry model was higher than the control class who were not treated using the Argument Driven Inquiry model. Before being given treatment, the results of the Mann Whitney test showed that the Asymp Sig value in the pretest for the experimental class and control class was 0.651 > 0.05. This shows that there is no significant difference between the experimental class pretest and the control class pretest. There was no difference because there was no treatment at the time of the pretest. After being given treatment, the results of the Mann Whitney test showed that the Asymp Sig value in the posttest for the experimental class and control class was 0.000 < 0.05. This shows that there is a significant difference between the experimental class posttest and the control class posttest. The significant differences were due to different treatments in the experimental class and control class. The experimental class was treated using the Argument Driven Inquiry model, while the control class was not treated using the Argument Driven Inquiry model. This is in accordance with research conducted by Mutiah and Ulfa (2022) which stated that there were significant differences in cognitive learning outcomes after

implementing the Argument Driven Inquiry model.

The magnitude of the increase in students' cognitive learning outcomes in the experimental class and control class is different. The average N-Gain value in the experimental class is 0.7444, which is in the high category. Meanwhile, the average N-Gain value in the control class is 0.2468, which is in the low category. Based on the average N-Gain results, the increase in students' cognitive learning outcomes in the experimental class that uses the Argument Driven Inquiry model is higher than the control class that does not use the Argument Driven Inquiry model. In accordance with research conducted by Rahayu et al (2019) that the Argument Driven Inquiry learning model can improve students' cognitive learning outcomes. The N-Gain graph for each cognitive learning outcome indicator can be seen in Figure 1.

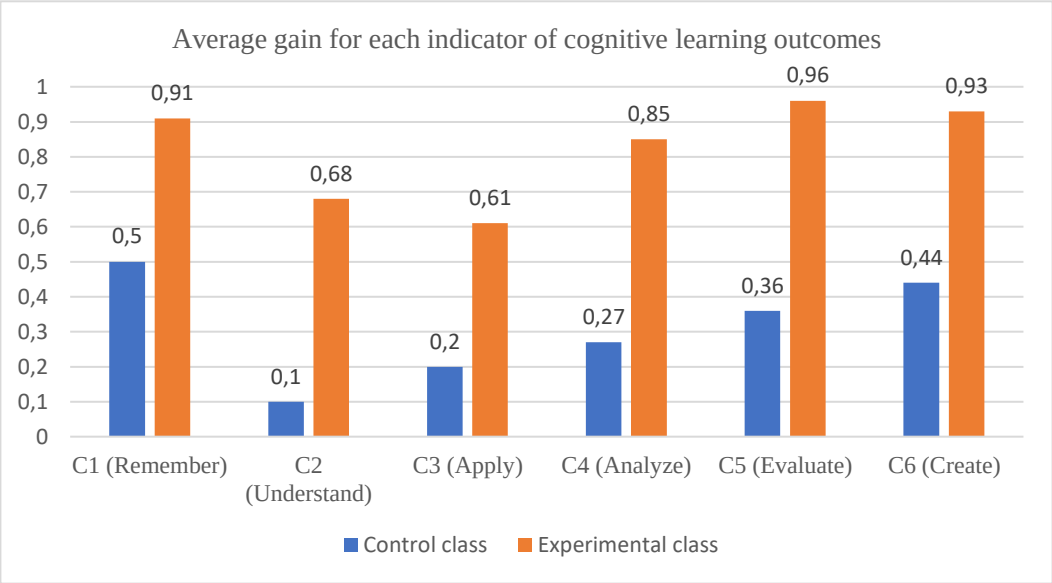

Figure 1. Average N-Gain Graph for Each Cognitive Learnng Outcome Indicator

In the remembering indicator (C1) the experimental class shows N-Gain with high improvement criteria (0.91). The stages of the Argument Driven Inquiry model that are able to improve students' memory skills are the activity of collecting data to answer hypotheses. At this stage, students are required to read information related to the problem presented, thereby involving the ability to remember before entering the next learning step. Amalia's research (2011) states that knowledge gained from one's own discoveries is remembered longer than knowledge gained from teacher lectures.

In the understanding indicator (C2) the experimental class shows N-Gain with moderate improvement criteria (0.68). The stage of the Argument Driven Inquiry model that is able to improve students' understanding abilities is the activity of collecting data in the second syntax. Through this stage, students are required to read material and information related to the problems presented, thereby involving the ability to remember and understand well. In accordance with the statement by Sampson & Gleim (2009) that the Argument Driven Inquiry model can help students to gain a deeper understanding in science learning.

In the applying indicator (C3) the experimental class shows N-Gain with moderate improvement criteria (0.61). The stage of the Argument Driven Inquiry model that can improve students' ability to

apply is data analysis. Before producing an argument, students must first analyze the data that has been collected. At the data analysis stage, students carry out a series of procedures to solve problems. Pujia's research (2019) explains that students must be able to apply the concepts they understand to find solutions to problems.

In the analyzing indicator (C4) the experimental class shows N-Gain with high improvement criteria (0.85). The stage of the Argument Driven Inquiry model that is able to improve students' analytical skills is the third syntax, namely the production of tentative arguments. This stage requires students to use a problem to analyze claims, evidence, justification, and support which are defined as answers to research questions and are based on evidence from experimental results or observations. In accordance with Rohmani's (2020) research, before providing an answer to a research question, it must go through an analysis stage.

In the evaluating indicator (C5) the experimental class shows N-Gain with the highest improvement criteria (0.96) compared to other cognitive learning outcome indicators. The stages of the Argument Driven Inquiry model that are able to improve students' ability to evaluate are the fourth and sixth syntax, namely the argumentation session and peer report review. At this stage students examine other groups' reports and evaluate other groups' reports. Students are also required to provide clear feedback on other groups' reports. As stated by Sampson et al (2010) in the argumentation session, students from each group can present their arguments and provide rebuttals to other groups' arguments and criticize other groups' reports to determine the most valid and acceptable claims.

In the creating indicator (C6) the experimental class shows N-Gain with high improvement criteria (0.93). The stage of the Argument Driven Inquiry model that is able to improve students' creative abilities is the fifth syntax, namely the preparation of an investigation report. At the stage of preparing an investigation report, students are required to prepare an investigation report that explains the objectives of the research, research methods, and arguments for the research results (Sampson et al., 2010).

The syntax for the Argument Driven Inquiry model is all contained in the LKPD. The results of the N-Gain analysis for each indicator of cognitive learning outcomes in the experimental class are in the high category except for C2 and C3 which are in the medium category. In the control class, cognitive learning outcome indicators C2, C3, and C4 are included in the low category. The low increase in cognitive learning outcomes in the control class was due to the fact that the Argument Driven Inquiry model was not implemented so that there were no activities to collect data, analyze data and produce tentative arguments that could help improve indicators C2, C3 and C4. Cognitive learning outcome indicators C1, C5, and C6 in the control class are in the medium category compared to the experimental class which is in the high category. This is because in the control class the Argument Driven Inquiry model was not implemented so there were no data collection activities, argumentation sessions, peer report reviews, and preparation of investigation reports which could help improve indicators C1, C5, and C6.

Factors that influence low cognitive learning outcomes apart from not implementing the Argument Driven Inquiry learning model, namely internal and

external factors. External factors can come from the Islamic boarding school environment, friendships, and tasks outside academic learning such as memorizing the Al-Quran, organizational activities, and other dormitory activities. Meanwhile, internal factors can come from the student's physical, psychological and mental conditions.

The use of the Argument Driven Inquiry model also has a big influence on students' cognitive learning outcomes, as evidenced by the effect size of 2.3725 which is included in the high category. This indicates that the Argument Driven Inquiry learning model has a big influence on cognitive learning outcomes. Thus it can be said that the Argument Driven Inquiry learning model is effective in improving students' cognitive learning outcomes.

CONCLUSION

Based on the existing research questions, it can be concluded that the Argument Driven Inquiry (ADI) learning model is also effective in improving the cognitive learning outcomes of junior high school students.

Based on the research results, the suggestion that can be given is that the use of the Argument Driven Inquiry learning model in further research can be applied to different material, measuring different student abilities, and at different grade levels. Apart from that, teaching staff are encouraged to apply learning models that actively involve students and emphasize argumentation activities such as the Argument Driven Inquiry learning model. Apart from that, teaching staff are also encouraged to implement collaborative learning so that students can exchange opinions in solving problems

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