ANALYSIS OF COGNITIVE ABILITIES OF CLASS VII STUDENTS IN PHYSICS LEARNING AFTER THE APPLICATION OF THE MODEL ADVANCE ORGANIZER LEARNING

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Abstract: This study aims to determine the cognitive abilities of students on the concept of heat and its transfer in class VII SMP Negeri 5 Kota Ternate. This data collection uses reliability, distinguishing power and difficulty level test techniques. The test instrument used is a description question consisting of 8 questions of students' cognitive abilities. The data were analyzed quantitatively. The subjects of this study were students of class VII SMP Negeri 5 Kota Ternate as many as 26 students. From the overall cognitive results which include 3 indicators of students' cognitive abilities where students reach the sufficient category, namely in the pretest results of 15 students and postest 20 students with an average score of 41-60, because students are able to understand the problem and can explain appropriately in solving the problem, in the less category the pretest results of 8 students and postest 3 students with an average score of 21-40, while in the very poor category the pretest results of 2 students and 3 students with an average score of 0-20, because when answering questions students only focus on solving problems do not follow the stages in solving problems, students have not been trained to formulate problems by writing what is known and what is asked in the problem.

Keywords: Student Cognitive, Advance Organizer

INTRODUCTION

Hanh, et al (2021), Education is an important component as a key in building the future with the aim of improving the quality of human resources whose process occurs continuously. Education is an effort to develop the human potential of students, both physical potential, creative potential, taste, and work, so that this potential becomes real and can function in the course of his life (Mesiono, 2018). In addition, education plays a role in improving students' cognitive abilities in order to develop the potential contained in students. Cognitive abilities can be interpreted regarding ideas, ideas and problem solving from individuals (Mubarok et al., 2018; Mubarok et al., 2023). Many people think that cognitive and logic- mathematic abilities are closely related to children's numeracy skills, even though according to Piaget's perspective, cognitive development or ability is the ability to think (Sulyandari, 2021). Cognitive abilities are brain-based skills needed to perform any task from simple to the most complex (Basri, 2018). Piaget concluded that cognitive is how learners adapt and apply the objects around them. Piaget states that learners play an active role in assembling knowledge of reality, learners are not passive in collecting information (Gustalia & Setiyawati, 2018; Gustalia & Setiyawati, 2023). Cognitive ability is one of the main indicators of the success of the learning process in addition to affective and psychomotor aspects. Therefore, analyzing students' cognitive development is very important in an effort to determine the right learning strategy to achieve learning objectives (Prabowo & Widodo, 2018).

According to Lewin (Ekawati, 2019) Lewin developed a Cognitive-Field learning theory by paying attention to personality and social psychology. Learning takes place as a result of changes in cognitive structures. Lewin argues that behavior is the result of interactions between forces both from individuals such as goals, needs psychological pressure and those from outside the individual such as challenges and problems.

Physics learning is a compulsory learning that must be mastered by students of the natural science group (IPA) (Haspen et al., 2021). Natural science involves a process that includes scientific behaviors and skills essential for conducting scientific inquiry and developing knowledge. It also encompasses information products such as ideas, facts, theories, concepts, and scientific laws, all considered part of scientific knowledge. Students consider physics to be a lesson that is difficult to understand and some even think that physics is the most difficult lesson compared to others because it requires high reasoning (Lany et al., 2017). Students have difficulty learning physics, including (1) difficulty counting (2) difficulty understanding concepts and (3) difficulty in understanding physics formulas (Daun et al., 2022). Learning

physics by using interesting learning media can help students. In physics learning, interesting learning media affects student response. Students tend to understand the material more easily and focus more on the learning process when the media used is interesting (Fauziah & Sulisworo, 2022).

Teachers are educators who are required to have 4 competencies, namely pedagogical competence, professional competence, personality competence and social competence (Febriana, 2019). The role of learning media in the learning and teaching process is an inseparable part of the world of education (Lestari, 2020). With the development of technology and information, learning media plays an important role to assist in the teaching and learning process, so that an educator can take advantage of learning media that is starting to develop to serve as a tool in delivering material so that the teaching and learning process is easier to do (Junaidi, 2019). The learning atmosphere and the way teachers teach are influenced by the learning model used. The right learning model that is in accordance with the characteristics of students and the material presented affects the attractiveness of students in participating in the learning process (Rahmawati et al., 2018). The use of learning media in the teaching and learning process can develop new interests and desires, arouse motivation and even have a psychological influence on learning (Wulandari et al., 2023).

Mufit et al. (2019) The use of concepts that do not follow scientifically accepted concepts from experts or scientists is called misconception. Prata et al. (2021) Misconceptions in physics are defined as the use of concepts that are not in accordance with the concepts of physics explained by physicists/experts who have been scientifically accepted. The problem of misconceptions and low concept understanding is a problem that occurs a lot in physics learning.

Sulisworo et al. (2017) Learning outcomes are the abilities or competencies possessed by students after obtaining learning experiences. Evaluation is the process of collecting, assessing, and interpreting data to ensure the level of achievement of a student's learning goals (Jumrodah et al. 2024). Learning outcomes are important in the learning process because this is an indicator that can be used as a reference to determine the learning progress of students, as feedback for improving the learning process in order to achieve predetermined learning objectives. From these learning outcomes, educators can design further learning that is in accordance with the characteristics of students.

Based on the results of observations made by researchers with physics teachers of class VII SMP Negeri 5 Ternate City, seen from the learning behavior of students found in various

problems, namely: (1) The process of cognitive abilities there are still students who do not understand the concepts and misconceptions in physics learning, (2) There are students who lack courage in asking questions, (3) There is no seriousness of students in the teaching and learning process, (4) Student learning outcomes are still low so that it has not met the KKM (Minimum Completeness Criteria) standard of 70. The above problems are found in class VII students of SMP Negeri 5 Kota Ternate.

METHOD

The method used in this research is descriptive research with a quantitative approach that aims to reveal something as it is. The research was conducted with the main objective to analyze the cognitive abilities of students in answering questions about heat and its transfer.

The data analysis used in this research is descriptive analysis, to determine the cognitive abilities of students through the advance organizer learning model on heat and its transfer material as follows:

Calculating the percentage of students' cognitive abilities

$$\text{Percentage Value} = \frac{\text{Acquisition Score}}{\text{Maximum Score}} \times 100\%$$

Table 1.1 Percentage of Students' Cognitive Ability

Score	Category
81% - 100%	Very good
61% - 80%	Good
41% - 60%	Simply
21% - 40%	Ugly
0 - 20%	Very bad

FINDING AND DISCUSSION

The results of research conducted at SMP Negeri 5 Kota Ternate, there was a sample of 26 students in class VII. The research data were obtained based on the test results of 8 items of questions that had been carried out during the research. The data of the students' work before being analyzed, was first assessed based on the scoring rubric. Based on the test data, researchers obtained the results of measuring students' cognitive abilities. The results showed that the cognitive abilities of 26 students were partly in the sufficient category.

The results of the pretest and posttest research analysis obtained are as follows, showing the value of students' cognitive abilities with different criteria.

Table 1.2 Student Cognitive Ability Pretest Achievement

No.	Value	Number of Students	Criteria
1	81-100	0	Very good
2	61-80	0	Good
3	41-60	15	Simply
4	21-40	8	Less
5	0-20	2	Very less

Table 1.3 Posttest Achievement of Students' Cognitive Ability

No.	Value	Number of Students	Criteria
1	81-100	0	Very good
2	61-80	0	Good
3	41-60	20	Simply
4	21-40	3	Less
5	0-20	3	Very Less

Based on table 1.2, it can be seen that the pretest results in class VII1 as many as 15 students obtained sufficient scores out of 26 students, as many as 8 students obtained scores that were less than 26 students, and as many as 2 students obtained scores that were very less than 26 students. While table 1.3 can be seen that the posttest results, as many as 20 students obtained sufficient scores out of 26 students, as many as 3 students obtained less than 26 students, and as many as 3 students obtained very less than 26 students.

Students' cognitive abilities are in 3 categories, namely sufficient, less and very less. In the very poor criteria, the pretest results had 2 students and 3 students on the posttest results. This is because when answering questions students only focus on solving the problem, not following the steps in solving the problem, students have not been trained to formulate problems by writing what is known and what is asked in the problem. In the less criteria, in the pretest results there were 8 students and 2 students in the posttest results, this is because students were able to understand the problem addressed by writing what was known and what was asked in the problem. And sufficient criteria, in the pretest results there were 15 students and 20 students in the postest results, this is because students were able to understand the problem, could explain

correctly in solving the problem, could identify the relationships between statements, questions, and concepts given in the problem.

Based on the achievement of the results of students' cognitive abilities above, the percentage of students' cognitive abilities per indicator is obtained as follows:

Table 1.4 Student Cognitive Ability Pretest Percentage

No.	Student Cognitive Indicators	Total Acquisition Score	Maximum Number of Scores	Percentage (%)	Category
1	Understanding	277	312	88,7%	Very good
2	Remembering	286	312	91,6%	Very good
3	Applying	164	208	78,8%	Good

Table 1.5 Percentage of Students' Cognitive Ability Posttest

No.	Student Cognitive Indicators	Total Acquisition Score	Maximum Number of Scores	Percentage (%)	Category
1	Understanding	275	312	88,1%	Very good
2	Remembering	284	312	91%	Very good
3	Applying	185	208	88,9%	Very good

Based on table 1.4, it can be seen that the qualitative percentage of cognitive abilities of students in class VII1 (pretest) for indicators of understanding is 88.7% very good, indicators of remembering 91.6% very good, and indicators of applying 78.8% good (Appendix 16). As for the cognitive abilities of students in class VII1 (posttest) for indicators of understanding 88.1% very good, indicators remember 91% very good, and indicators apply 88.9% very good, can be seen in table 1.5.

1. Indicator of Understanding

In this aspect students can write the relationship of the concepts used in solving the problem and write what to do in answering the problem. Students in answering questions need to have sufficient understanding of the material because it will affect in determining the concepts used in working on problems. The understanding indicator has a very high qualification. The following figure shows the understanding indicator in question numbers 1, 2, and 8 in class VII with pretest and posttest results.
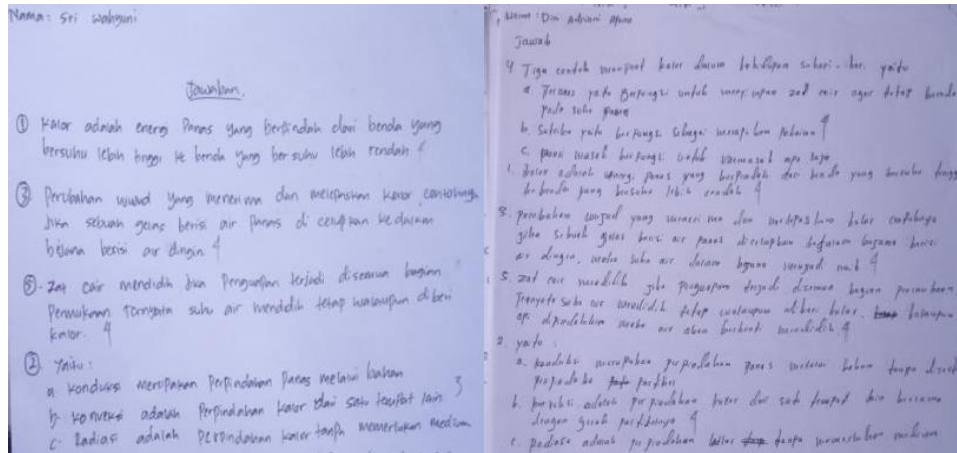
Figure 1.1 Understanding Indicator Answers

Based on the results seen in Figure 1.1 there are students who have understood the concepts, one of which is explaining the meaning of heat and heat transfer. The very high cognitive achievement of students on the understanding indicator shows that students are familiar with concept problems.

2. Indicators of Recall

Cognitive abilities of students on indicators of remembering, students can write the meaning of the problem clearly and can write the benefits of heat in the problem correctly. In this cognitive indicator, most students are able to describe the problem and write what is asked. This indicator is found in questions 3, 4 and 5 in class VII with pretest and posttest results.
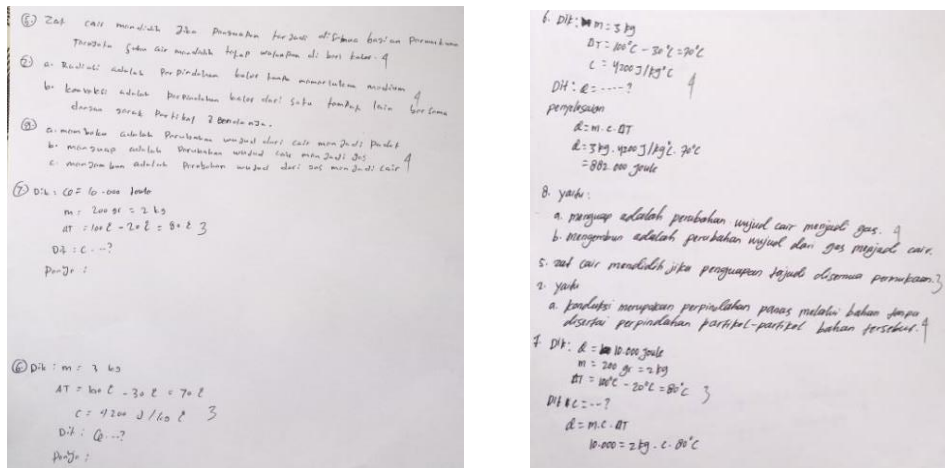

Figure 1.2 Answers to The Remembering Indicators

Based on the seen in Figure 1.2 are students who have been able to solve the problem correctly. This means that students' understanding in the recall indicator which shows the ability of students to apply the science skills they have understood in solving students' cognitive problems is fairly good and very good, so the percentage on this indicator is 78.9% and 84.2%.

3. **Indicator of Applying**

In the aspect of applying, students can know what is used in solving problems and use procedures, namely formulas and knowledge that have been obtained. In the application indicator, there are questions 6 and 7 in class VII with pretest and posttest results.
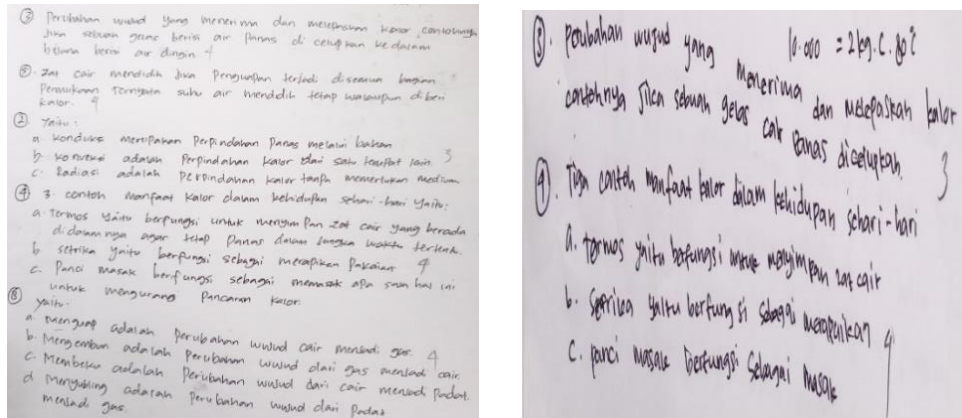

Figure 1.3 Applying Indicator Answers

The results seen in Figure 1.3, students can solve the problem of the relationship between heat and the amount of heat contained in the problem. This is because during learning students are trained in solving problems in determining the formula used so that the percentage on the indicator of applying this is categorized as good.

CONCLUSION

Based on the results of research and discussion of students' cognitive abilities in solving problems on the material of heat and its transfer in class VII1 SMP Negeri 5 Kota Ternate which amounted to 26 students obtained pretest scores of cognitive abilities achievement as many as 15 students in sufficient criteria with a range of values (41-60), 8 students with less criteria with a range of values (21-40), and 2 students with very poor criteria with a range of values (0-20). For the qualitative percentage of students' cognitive abilities for understanding indicators of 88.7% (very good), indicators of remembering 91.6% (very good), and indicators of applying 78.8% (good). While the posttest, the achievement of cognitive abilities as many as 20 students with sufficient criteria with a range of values (41-60), 3 students with less criteria with a range of values (21-40), and as many as 3 students with very poor criteria with a range of values (0-20). For a qualitative percentage of students' cognitive abilities for understanding indicators of 88.1% (very good), indicators of remembering 91% (very good), and indicators of applying 88.9% (very good).

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