

Improving Natural Science Cognitive Learning Outcomes Through the Make-A-Match Learning Model

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ABSTRACT

This research is based on the finding that the cognitive learning outcomes of fourth grade students in natural sciences subjects are still very low. This study aims to improve students' cognitive learning outcomes in science subjects by applying the Make-a-Match learning model. This study used classroom action research. The research was conducted on 24 fourth grade students in one of the elementary schools in Tanjung Jabung Barat Regency. The research was conducted in two cycles: planning, implementation, observation, and reflection. The instruments used in this study were cognitive learning outcomes test questions, observation sheets, and interview guidelines. The results showed that students' learning outcomes improved, based on the average score of cognitive learning outcomes they obtained, namely 50.5 in pre-cycle, 74.21 in cycle I, and 81.04 in cycle II. In addition, students are more active in participating in learning that applies the make-a-match learning model.

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1. INTRODUCTION

Education is universally recognized as a fundamental driver of national development, with its significance extending beyond just the acquisition of knowledge to shaping the future of nations, including Indonesia. Through a robust and inclusive educational system, it is possible to cultivate high-quality human resources capable of navigating the complexities and challenges of an increasingly globalized world [1], [2]. At the heart of education lies the critical objective of enhancing the quality of student learning outcomes, particularly within the cognitive domain. Cognitive learning outcomes are central to the educational process as they serve as key indicators of students' intellectual capabilities, including their ability to comprehend, critically analyze, and apply the knowledge they acquire in meaningful ways [3]–[5]. These cognitive abilities form the bedrock upon which other essential skills, such as critical thinking, problem-solving, and innovation, are built. Such competencies are not only vital for academic success but also indispensable for tackling real-world challenges across various sectors, including technology, business, and governance.

Furthermore, superior cognitive learning results empower students to interact with and comprehend intricate subject matter, establishing a robust basis for profound understanding and further study in particular fields. In disciplines like natural sciences, which need rigorous intellectual engagement, cognitive aptitude is essential. It enables students to comprehend fundamental concepts, engage in research, and contribute to scientific questions vital for advancing technology and addressing global challenges. Students proficient in cognitive learning are not only prepared for higher education but also poised to become future leaders in

science, technology, engineering, and mathematics (STEM). Their ability to engage with pioneering research, innovate, and contribute to the advancement of new technologies is essential for national progress.

The quality of cognitive learning outputs directly affects a nation's global competitiveness. A nation with a solid educational system that reliably yields graduates with good cognitive abilities is more likely to promote economic growth, scientific advancement, and technological leadership. By prioritizing the improvement of cognitive learning outcomes, Indonesia may cultivate a well-equipped workforce capable of contributing to the nation's long-term development and prosperity. Ultimately, these objectives are crucial for both the academic progress of students and their capacity to actively influence the future of their nation.

At the elementary school level, Science subjects have an important role in forming the basis of students' scientific knowledge [6]. Natural Science (IPA) subjects have an important role for elementary school students because they build the basis of knowledge about nature and the environment around them. Through science learning, students are taught to observe, investigate, and understand natural phenomena scientifically, which helps develop logical and critical thinking skills. In addition, science helps students understand the basic concepts of science, which will be the foundation for learning at the next level of education. The importance of science also lies in the formation of scientific attitudes, such as curiosity, honesty, and cooperation, which are needed in everyday life. With a good understanding of science, students can be better prepared to face increasingly complex global challenges, especially in technology and the environment. However, in reality, students' cognitive learning outcomes in science subjects in Indonesia are still relatively low [7]–[12].

The low learning outcomes of science in elementary schools are a significant concern for educators and researchers. Some of the factors causing low science learning outcomes include less varied learning methods [13], [14], limited learning facilities [15], and lack of student motivation [16]–[19]. In addition, monotonous learning and lack of interaction between students often make students less interested in science subjects. This results in students not achieving optimal learning outcomes, especially in the cognitive domain. The low cognitive learning outcomes will cause students' understanding to become fragmented or incomplete (based on resource theory) [20]–[23]. These findings have also been found in observation activities in one of the elementary schools in Tanjung Jabung Barat Regency. Therefore, it is necessary to take classroom action to reduce the problems.

Innovative and interactive learning models are needed to overcome students' low cognitive learning outcomes in science subjects. One learning model that is effective in improving students' cognitive learning outcomes is the Make a Match model [24]. The Make-a-Match model is one of the learning methods designed to make the learning process more interactive and fun [25]. In this model, students are invited to match cards containing questions with correct answers. These cards are usually distributed randomly, and students are asked to find the right pair within a predetermined time. This model effectively improves students' understanding, as it involves an element of play that motivates them to participate actively. In addition, Make-a-Match also helps improve memory and understanding of concepts, as students not only listen to the teacher's explanation but are also directly involved in the learning process through physical activity and social interaction. This model is very suitable for application in science learning in elementary school because it can help students understand scientific concepts more interestingly and interactively.

2. METHOD

This research used the Classroom Action Research (PTK) method implemented in one of the elementary schools in Tanjung Jabung Barat Regency, involving 24 fourth-grade students as respondents. Classroom action research is one of the research designs that aims to find the best 'way' to improve student learning activities and outcomes in the classroom [26]. This study aims to improve students' cognitive learning outcomes in science subjects by applying the Make-a-Match learning model. The research was conducted in two cycles: planning, implementation, observation, and reflection.

The research instruments used include several types of data collection tools. First, learning outcome tests in the form of cognitive tests are used to measure the improvement of students' abilities after the application of the Make-a-Match model. This test consists of multiple-choice questions and descriptions at each cycle's end. Second, the student activity observation sheet recorded student activeness and involvement during learning. This observation includes indicators of student activeness in discussion, cooperation between students, and their involvement in matching cards in the learning model. In addition, the observation sheet was also used to assess the teacher's skills in managing learning, explaining the material, and facilitating the use of the Make-a-Match model. To complete the data, student questionnaires were used to find out their perceptions and responses to the application of this learning model.

The research procedure began with the planning stage, where researchers and teachers developed a lesson plan using the Make-a-Match model, including the preparation of research instruments such as test questions, observation sheets, and questionnaires. Furthermore, the implementation stage is carried out by

implementing learning according to the plan that has been made. Students actively match cards containing questions and answers in an interactive learning atmosphere. In the observation stage, student and teacher activities are intensively observed to see the effectiveness of the application of the learning model. Reflection was conducted after each cycle to evaluate the results and correct the shortcomings before entering the next cycle.

The data obtained was analyzed using two approaches. Quantitative data analysis was carried out by calculating the average value of student learning outcomes tests and the percentage of completeness, as well as comparing the improvement of learning outcomes between cycles. Learning completeness is calculated based on the percentage of students who reach the Minimum Completion Criteria (KKM), which is 75. On the other hand, qualitative data from observation sheets and questionnaires were analyzed by describing findings related to student activeness and response, as well as teacher effectiveness in managing learning. The results of this analysis were used to assess the positive impact of applying the Make a Match model on improving students' cognitive learning outcomes.

3. RESULTS AND DISCUSSION

The results of this study are based on the scores of students' cognitive learning outcomes that they have obtained. The descriptive statistics of students' cognitive learning outcomes scores are shown in Table 1.

Table 1. The Statistic Descriptive of Students Cognitive Learning Outcome Score

	Pre-cycle	Cycle I	Cycle II
Rata-Rata	50.5	74.21	81.04
Minimal	24	54	63
Maksimal	85	96	96

Based on the data in Table 1, it can be seen that learning with the Make-a-Match model has a positive effect on improving students' cognitive learning outcomes. In the pre-cycle, the average student learning outcomes only reached 50.5, with a minimum score of 24 and a maximum of 85, which showed that most students had not achieved optimal learning completeness.

After implementing the Make-a-Match model in cycle I, the average student score increased significantly to 74.21. This increase can also be seen from the minimum score, which rose to 54, and the maximum score, which reached 96. This indicates that most students began to better understand the material taught. In cycle II, the average student learning outcomes again increased to 81.04, with a higher minimum score of 63, and the maximum score remained at 96. This increase shows that the application of the Make-a-Match model consistently succeeded in increasing students' cognitive learning outcomes, improving their understanding of the material, and minimizing the number of students who got very low scores. Overall, the Make-a-Match learning model proved effective in improving the quality of learning and students' cognitive learning outcomes in science subjects. In addition, the success of this research is also indicated by the number of students who reached the KKM score. The data is shown in Figure 1.

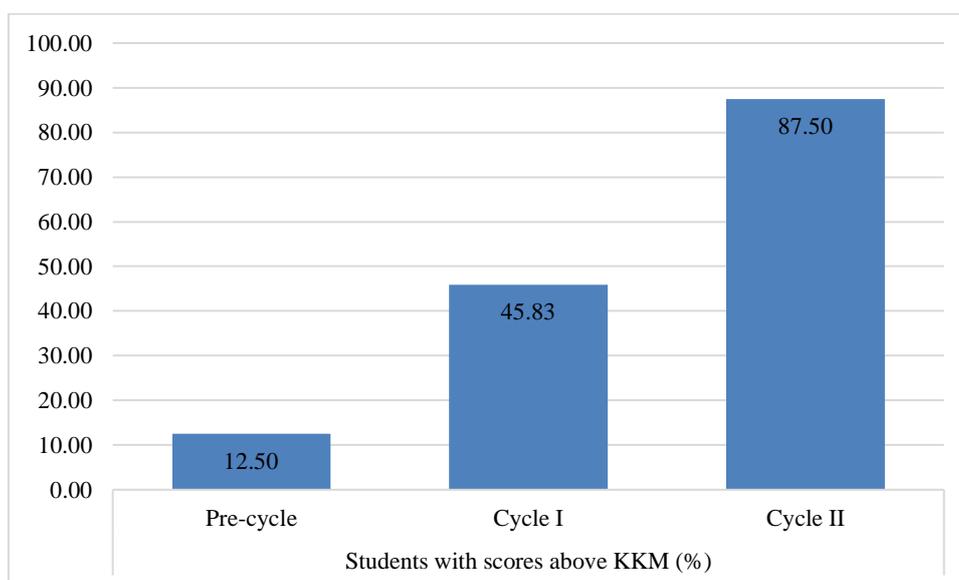


Figure 1. Percentage of Students Achieving the KKM Score

Based on the data displayed in the table of the percentage of students who achieved scores above the Minimum Completeness Criteria (KKM), there was a significant increase after the implementation of the Make a Match learning model. At the pre-cycle stage, only 12.5% of students were able to achieve scores above the KKM, which shows that the majority of students did not understand the material well. After the implementation of the Make a Match learning model in cycle I, the percentage of students who achieved scores above the KKM increased sharply to 45.83%. This shows the learning model's positive impact on student learning outcomes. Further improvement occurred in cycle II, where the percentage of students who achieved scores above the KKM jumped to 87.5%. This shows that almost all students successfully understood the material after the second cycle of learning using the Make-a-Match model.

The results of this study are in line with the results of past research. Fiddiniya et al. [27] showed that the application of the make-a-match learning model accompanied by card media could improve the learning outcomes of fifth-grade students in natural science subjects. Andriani et al., [28] have also successfully shown that the make-a-match learning model accompanied by video media can improve understanding of science concepts in grade V students. Similar findings were also obtained from the results of Kusumaningtyas' research [29]. The results of these studies indicate that the make-a-match learning model generally has a positive impact on students, especially in improving learning outcomes.

Not only the improvement in learning outcomes, the results of learning observations show that student activeness has increased. We found that students were more interested in participating in learning activities. They were more enthusiastic about following the teacher's directions. This observation result is also supported by students' answers during the interview. They found learning with the make-a-match model more fun. Students said that learning is more fun because it is like playing. This finding is in line with the results of research from Lompoliuw [30], which showed an increase in student learning activities after applying the make-a-match learning model.

4. CONCLUSION

The make-a-match learning model is a suitable learning model to be applied to science learning. Based on the results of this study, students' cognitive learning outcomes have increased. This is indicated by the average student score, which increased from pre-cycle to cycle I and cycle I to cycle II. In addition, the number of students who reached the minimum completeness criteria also increased. Not only the score of cognitive learning outcomes, by applying the make-a-match learning model, students also become more active in learning.

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