

EFFORTS TO IMPROVE SCIENCE LEARNING OUTCOMES THROUGH THE DISCOVERY LEARNING MODEL ASSISTED BY INTERACTIVE MEDIA FOR SEVENTH-GRADE STUDENTS AT SMP NEGERI 2 PANGKAJENE

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Abstract

This research is based on the learning model traditionally applied to grade 7 science learning. The low mastery of science learning outcomes for the students of class VII Ibnu Batuta SMPN 2 Pangkajene. The purpose of this study was to see: (1) improve the presentation of mastery learning outcomes using Discovery Learning-based learning models assisted by interactive media, (2) improve learning outcomes using Discovery Learning-based learning models assisted by interactive media. Research method The technique used is Collaborative Classroom Action Research (PTKK). The data collection technique is based on the results of learning tests and observation sheets on the implementation of the learning model. The results showed that (1) the percentage of classical completeness increased from 16.12% in the very low category before the cycle, 48.39% in the low category in the first cycle and 96.67% in the very high category in the second cycle; (2) the category of increasing learning outcomes of class VII Science students at Ibnu Batuta SMPN 2 Pangkajene has increased from 0.37 in the moderate category to 0.68 in the moderate category with an increase of 0.31 in the medium category.

Keywords: *Collaborative Classroom Action Research, Discovery Learning, Interactive Media, Learning Outcomes.*

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INTRODUCTION

Science (IPA) is one of the core subjects taught in schools. A science class provides students with information, ideas, and concepts about the natural environment, which are gained through experiences in various scientific processes, such as research, organization, and development of ideas (Lestari, 2019). Therefore, science activities, which are rich in thinking processes, can be a tool to enhance the quality of human resources in Indonesia, particularly in improving critical thinking skills. Students' thinking abilities influence their personality development (Zubaidah, 2017). Science education may also help individuals develop understanding, thinking habits, and enable students to acquire many life skills, such as observation, prediction, and scientific attitudes. Science has a long history of generating new knowledge and applying it in life on a large scale, including driving technological development (Yuniati, 2018). Science education does not only focus on the cognitive domain but also on the affective and psychomotor domains as aspects of assessing learning outcomes achieved by students. Student learning outcomes are influenced by two factors: internal factors and external factors (Pingge & Wangid, 2016; Raresik et al., 2016). According to Widiyanti and Nisa (2021), poor science learning outcomes are caused by various factors affecting the learning process. These factors include inadequate teaching approaches and models, limited variation in materials and supporting learning media, as well as the inability of electronic worksheets (LKPD) to meet students' learning needs.

The 2015 International Student Assessment Program (PISA) showed that Indonesian students' learning outcomes were still relatively low. Indonesian students ranked among the lowest in science, reading, and mathematics, with rankings of 62nd, 61st, and 63rd out of 69 countries (Pratiwi, Cari, Aminah, 2019). The low learning outcomes of Indonesian students were also reflected in the findings of the 2022 PISA. Indonesia ranked 71st out of 80 participating countries in this program, with an average score of 398, far below China, which ranked first with an average score of 590 (Permana, 2019).

Science and technology are rapidly developing in the era of the Industrial Revolution 4.0, which aligns with 21st-century learning. With the advancement of knowledge and technology, students and teachers are increasingly encouraged to utilize technological sophistication in the teaching and learning process (Wiyonto

& Zaskiyah, 2019). In addition to using learning models, learning media become supporting factors in creating interactive learning that enhances students' learning outcomes, one of which is by using Canva as a learning medium. Canva is an easy-to-use online design and visual communication application. This application can be used to create PowerPoint presentations, posters, concept maps, documents, and other visual content that includes animations, images, and audio, making it highly suitable as a learning medium (Ferdiansa et al., 2023). According to Kharissidqi & Firmansyah (2022), the advantages of using Canva in creating PowerPoint presentations as a learning medium include a wide variety of attractive designs, enhancing teachers' creativity in designing learning media, and time efficiency. This application is very useful for the education sector, especially for teachers in creating engaging teaching materials and learning media.

According to Durajad (2008), the Discovery Learning model is a learning theory defined as a learning process that occurs when learners are not presented with lessons in their final form but are expected to organize the material themselves. The procedure for Discovery Learning according to Yuliana (2018) is as follows:

1. Stimulation: The first step is to provide a problem that arouses students' curiosity, prompting them to investigate the issue further. Students may also be given activities such as library research, practical work, and other learning activities that lead to problem-solving preparation.
2. Problem Statement: The next step is to give students the opportunity to identify problems encountered during the initial activity. Allowing students to identify and analyze the problems they face is a useful technique in helping them become accustomed to discovering problems. The problems found are then formulated into questions or hypotheses.
3. Data Collection: The hypotheses proposed are verified through exploration activities conducted by students with guidance from the teacher. Verification is done by collecting relevant data or information through observation, interviews, experiments, library research, or other activities that support hypothesis testing.
4. Data Processing: The collected data is then processed into clear, meaningful information. Data processing can be done in various ways, such as sorting, classifying, calculating by specific methods, and interpreting it with a certain level of confidence.
5. Verification: At this stage, students carefully examine the data to verify the accuracy of the initial hypotheses. Verification is based on the data processing results from the previous stage.
6. Generalization: The generalization or conclusion-drawing stage involves making a conclusion that can be applied as a general principle for all similar events or problems, based on the verification results. After drawing conclusions, students should focus on the generalization process that emphasizes the importance of understanding the lesson in terms of broad meanings, rules, or principles, which underlie a person's experiences and the significance of organizing and generalizing those experiences.

In the researcher's observations, field evidence shows that the implementation of 21st-century learning is still lacking, with a focus primarily on the cognitive domain of students. The use of technology has not been fully utilized, resulting in a learning process that is not yet integrated with the demands of the current era. Moreover, conventional teaching methods make learning monotonous, causing students to feel bored during science lessons. This lack of student participation and engagement leads to a lack of motivation and difficulty in focusing on science, often considered by students as a challenging and unenjoyable subject. Cooney and Cotton (in Khat, 2010) state that some students find science interesting, while others find it boring.

Based on preliminary observations, data was obtained that the number of students in class VII Ibnu Batuta at SMP Negeri 2 Pangkajene is 31 students, consisting of 17 female students and 14 male students. It was found that many students in class VII Ibnu Batuta have scores below the Minimum Competency Criteria (KKM). The KKM set by the school is 70. From the observation results, only 5 students (16.12%) have achieved the KKM in the science subject, scoring above 70. Meanwhile, 26 students (93.87%) scored below 70. Learning is considered successful if it achieves a learning outcome completeness rate of around 80%. This indicates that the cognitive learning outcomes of students in class VII Ibnu Batuta at SMP Negeri 2 Pangkajene are very poor.

Several solutions can be implemented to improve science learning outcomes among students. These include applying learning models that can enhance learning outcomes, such as inquiry-based learning, discovery learning, and Problem-Based Learning (PBL), using teaching methods that sharpen students' understanding of science, such as practical methods, encouraging students to solve problems that challenge their cognitive domains, creating quality teaching materials, and utilizing technology in the learning process. The implementation of technology-assisted learning significantly influences the improvement of student learning outcomes (Sapti, 2019).

The purpose of this study is to observe the improvement in each cycle of the completeness rate of learning outcomes using a Discovery Learning-based model assisted by interactive media, and the enhancement of learning outcomes using the Discovery Learning-based model assisted by interactive media. Based on the above description and the observations in class VII Ibnu Batuta, this study was conducted under the title "Efforts to Improve Science Learning Outcomes Through Discovery Learning Model Assisted by Interactive Media for Students in Class VII at SMP Negeri 2 Pangkajene."

RESEARCH METHOD

The type of research used in this study is Classroom Action Research (CAR) with a descriptive method. This research was conducted at SMP Negeri 2 Pangkajene, located in the Pangkajene Kepulauan Regency, South Sulawesi. The respondents of the study were seventh-grade students during the odd semester of the 2023-2024 academic year. The independent variable in this study is the Discovery Learning-based science learning model assisted by interactive media, while the dependent variable is the science learning outcomes of the seventh-grade students at SMP Negeri 2 Pangkajene. Data collection techniques involved using cognitive learning outcome tests and observation sheets to monitor student learning activities. This study is limited to the science subject focusing on matter and its changes.

The CAR model used in this research follows the Kurt Lewin model, which consists of four stages: planning, implementation, observation, and reflection. The research was conducted over two cycles with the same class (Paizaluddin, 2016).

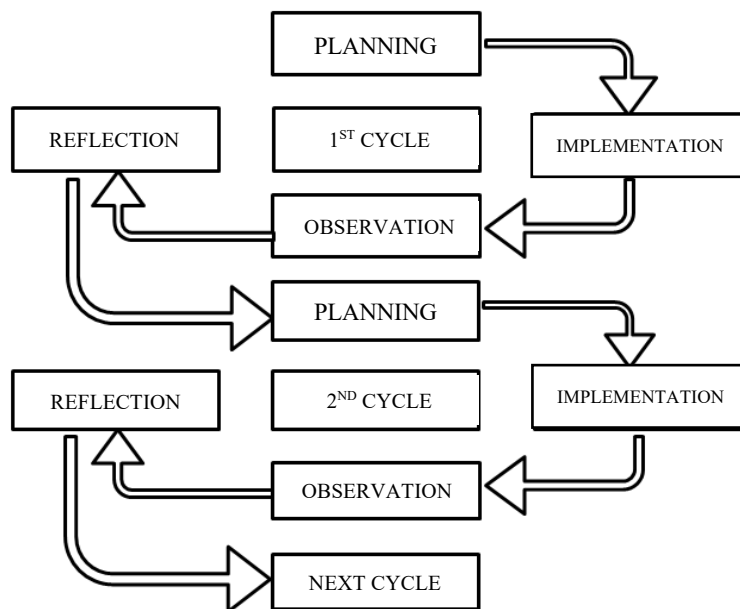


Figure 1. CAR Model

The scores obtained were analyzed using N-Gain analysis to determine the category of improvement in science learning outcomes. The N-Gain formula is as follows:

$$N-Gain = \frac{Posttest\ score - Pretest\ score}{Maximum\ score - Pretest\ score} \dots\dots\dots(1)$$

Table 1. N-Gain Categories

Interval Value	Category
$0,7 \leq N-Gain \leq 1,0$	High
$0,3 \leq N-Gain < 0,7$	Medium
$N-Gain < 0,3$	Low

Classical completeness was calculated using the following formula:

$$P = \frac{L}{n} \times 100\% \dots\dots\dots(2)$$

Note:

P = Percentage of students passing the KKM classically

L = Number of students who passed the KKM

n = Total number of students

The data obtained from the students' learning test results were then grouped using a Likert Scale with a scale of 1-5 as follows:

Table 2. Student Learning Outcomes Criteria

Assessment (%)	Criteria
$P > 85$	Very High
$75 < P \leq 85$	High
$65 < P \leq 75$	Moderate
$55 < P \leq 65$	Low
$P \leq 55$	Very Low

(Riduwan, 2013)

The data analysis used is descriptive analysis. Quantitative data was analyzed by calculating the average and classical completeness, which was then presented in the form of tables and graphs. The success indicator proposed in this study is that by Cycle II, the class average should be 80, with a learning outcome completeness rate of 80%.

RESULT AND DISCUSSION

The research data consists of the objective test scores of science achievement for seventh-grade students in the Ibnu Batuta class at SMP Negeri 2 Pangkajene, following the implementation of the Discovery Learning model assisted by interactive media. A summary of the research data on science achievement can be seen in Table 3.

Table 3 Research Results Summary

	Prasiklus	Siklus 2		Siklus 3	
		Pretest	Posttest	Pretest	Posttest
Average Score	50,3	40,00	61,67	63,75	88,33
Number of Students Passing	5	2	15	15	30
Presentasi Ketuntasan	16,12%	6,45%	48,39%	48,39%	96,77%

Based on Table 3, it can be observed that the average science achievement score of seventh-grade students in the Ibnu Batuta class was 50.3 before the implementation of the learning model. In Cycle II, the average score increased to 61.67, and in Cycle III, the average score further improved to 88.33. The number of students who met the minimum passing score (KKM) was 2 before the implementation of the learning model, increased to 15 in Cycle II, and 30 in Cycle III. In terms of percentages, the initial completion rate was 6.45% (very low category), increased to 48.39% (low category) in Cycle II, and further improved to 96.77% (very high category) in Cycle III.

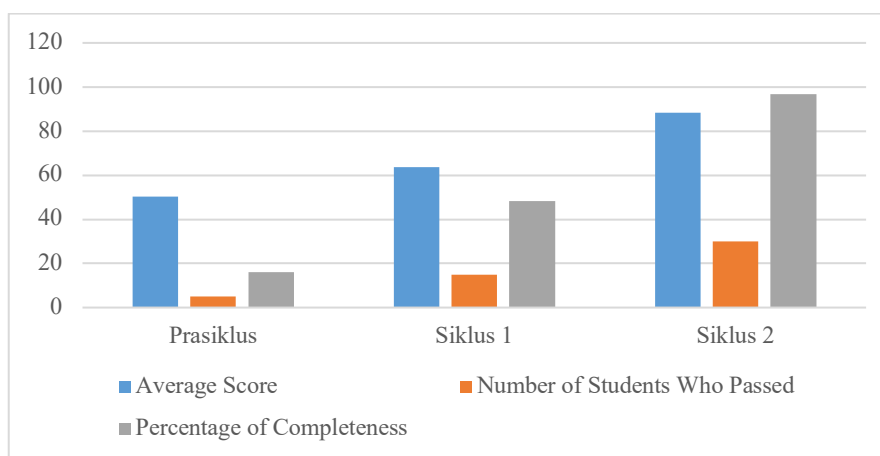


Figure 2. Learning Outcomes Graph

As shown in Figure 2, overall, student learning outcomes improved from the initial condition before using the Discovery Learning model assisted by interactive media to after using the Discovery Learning model assisted by interactive media. Additionally, the number of students meeting the minimum passing score also

increased. Therefore, it can be concluded that the Discovery Learning model assisted by interactive media can improve the learning outcomes of seventh-grade students in the Ibnu Batuta class at SMP Negeri 2 Pangkajene in the first semester of the 2023/2024 academic year.

Table. 4 Learning Outcomes Data for Cycle II

Description	Cycle II	
	Pretest	Posttest
Highest Score	70	90
Lowest Score	20	30
Average	40,00	61,67
Number of Students Meeting KKM	2	15
Total Students	31	31
Classical Completeness Percentage	6,45%	48,39%

Based on Table 4, the learning outcomes of students in Cycle II are categorized as low, with a classical completeness percentage of 48.39%.

Table. 5 Learning Outcomes Data for Cycle III

Description	Cycle III	
	Pretest	Posttest
Highest Score	80	100
Lowest Score	40	60
Average	63,75	88,33
Number of Students Meeting KKM	15	30
Total Students	31	31
Classical Completeness Percentage	48,39%	96,77%

Based on Table 5, the learning outcomes of students in Cycle III are categorized as very high, with a classical completeness percentage of 96.77%.

Table 6. Descriptive Analysis of N-Gain for the Ibnu Batuta Class

Cycle	Sample Size	N-Gain	Category
1	31	0,37	Medium
2	31	0,68	Medium
N-Gain		0,31	Medium

Based on Table 6, it is shown that the N-Gain score for the learning outcomes of 31 students in Cycle II falls into the medium category, with an average N-Gain of 0.37. This increased in Cycle III to an N-Gain of 0.68, still within the medium category.

The initial situation of the seventh-grade students in the Ibnu Batuta class for science was characterized by low completion rates relative to the Minimum Competency Criteria (KKM). This was evident from the data on the first pure Summative or Daily Test scores, where only five students achieved the KKM. Upon further examination, it was found that the teacher primarily employed traditional lecture-based teaching methods, supplemented by instructional media presentations. This approach was deemed insufficient in motivating students to actively participate in the learning process. Consequently, to address these issues, a problem-based learning model was selected to tackle the challenges identified during the observation.

a. Cycle II

Cycle II involved three stages: planning and implementation, observation, and reflection. In the planning stage, the preparation of instructional tools such as lesson plans (RPP), student worksheets (LKPD), and learning scenarios for each cycle was conducted. Observation sheets for student activities, PowerPoint presentations, and interactive learning materials were also created. Additionally, groups of five students were formed to develop test questions and answers.

During the implementation stage, the steps involved applying the lesson plan, which included an introductory activity, core activities, and a closing activity. In the introductory activity, the researcher initiated the lesson by greeting the students, taking attendance, outlining the competencies to be achieved by the end of the lesson, and providing a brief review using interactive PowerPoint images.

In the core activity, the researcher guided the students in understanding problems related to substances and their changes and worked through these issues according to the Discovery Learning model's syntax. After the students completed their presentations, the researcher concluded the lesson by reinforcing the key concepts as summarized by the students. In the closing activity, the researcher strengthened the material by administering a post-test and providing reflection on the learning process.

Observation and data collection were conducted concurrently with the learning activities, utilizing the assistance of school mentors, campus mentors, and field supervising lecturers as observers. Based on the results of the second cycle, 16 students scored below the KKM. The KKM completion rate was 48.39%, categorized as low, with an average score of 61.67. Cycle II exhibited several weaknesses, including inefficiencies in some learning steps. Although the lesson plan was executed, time management was not effective. The study continued, addressing the identified shortcomings in Cycle II, and progressed to Cycle III.

b. Cycle III

The planning stage for Cycle III was based on the reflections from Cycle II. Improvements were made to optimize the time allocated for practical teaching activities, data processing, and student presentations. Additionally, the researcher prepared the materials and tools more thoroughly to ensure the learning activities were more effective and efficient. The implementation of Cycle III followed similar procedures as the previous cycle. In the core activity, the researcher provided stimuli, presented problem statements, and allowed students to freely express their ideas. The researcher then distributed worksheets for the students to conduct investigations, followed by student presentations and conclusions. The researcher concluded the lesson by clarifying the concepts presented by the students. In the closing activity, the researcher reinforced the material by administering a post-test and providing reflection on the learning process.

Observations during Cycle III revealed an average performance score of 80. The learning completion rate was 96.77%, categorized as very high. This indicates that the scientific learning approach using the Discovery Learning model significantly enhanced student engagement and interest in learning science, leading to improved learning outcomes.

Initially, the completion rate was 6.45%, categorized as very low, increased to 48.39% (low) in Cycle II, and further rose to 96.77% (very high) in Cycle III. This demonstrates a consistent improvement in learning outcomes with each cycle. This finding aligns with the study by Yuliana (2018), which showed that the implementation of the Discovery Learning model greatly assists teachers in improving student learning outcomes. Additionally, this model fosters greater teacher-student interaction, enhances students' self-confidence, and supports independent problem-solving skills. The model is applicable not only in elementary schools but also in higher education levels such as junior and senior high schools.

The analysis of N-Gain revealed an N-Gain score of 0.37 in Cycle II, categorized as moderate, which increased to 0.68 in Cycle III, also categorized as moderate. This indicates an improvement of 0.31 in the moderate category. This improvement is consistent with the findings of Prastiya (2017), who reported an increase in the average N-Gain score, placing it in the moderate category.

CONCLUSION AND SUGGESTIONS

A. Conclusion

Based on the data analysis and discussion, it is evident that the implementation of the Discovery Learning model in teaching can enhance student learning activities. This is reflected in the increase in the average percentage of student learning mastery, which rose from 26.12% in the pre-cycle (categorized as very low) to 48.39% in Cycle II (categorized as low), and further improved to 96.77% in Cycle III (categorized as very high). Additionally, the average N-Gain score also showed improvement, rising from 0.37 in Cycle II (categorized as moderate) to 0.68 in Cycle III (categorized as moderate). This indicates a 0.31 increase from Cycle II to Cycle III.

B. Suggestions

Future research can explore these findings further by varying the stages of planning and implementation and incorporating different interactive learning media across various educational levels.

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