CO-CATALYST
Journal of Science Education Research and Theories

Vol. 2, No. 1, June 2024
e-ISSN: 3026 – 1597
DOI: 10.33830/cocatalyst.v2i1.8354

The Effectiveness of Discovery Learning in Improving Science Skills and Learning Outcomes for Class VIII Students at MTsN 7 Sumedang

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Article Info

Article History:
Received May 28th, 2024
Revised August 28th, 2024
Accepted August 29th, 2024

Keywords:
Science skills;
learning outcomes;
discovery learning model learning

ABSTRACT

This study was initiated due to the low science skills and learning outcomes observed among Class VIII A students at MTsN 7 Sumedang, where their performance was below the established Minimum Completeness Criteria (KKM). Recognizing the need for a more effective teaching approach, this research aimed to explore the impact of implementing the Discovery Learning model to enhance students' engagement, understanding, and proficiency in science. The Discovery Learning model encourages students to actively participate, investigate, and draw conclusions through hands-on experiences, fostering a deeper grasp of scientific concepts. The findings of this study reveal a substantial improvement in both the science skills and learning outcomes of the students, indicating that this model effectively addresses the existing learning gaps. The research demonstrates that the Discovery Learning model not only promotes better academic performance but also enhances critical thinking and problem-solving abilities. This approach has proven to be a valuable strategy in elevating the quality of science education for Class VIII students at MTsN 7 Sumedang.

How to Cite:
Normalia, P. & Suyana, I. (2024). The Effectiveness of Discovery Learning in Improving Science Skills and Learning Outcomes for Class VIII Students at MTsN 7 Sumedang. *Co-Catalyst: Journal of Science Education Research and Theories*, 2 (1), 59-67.

INTRODUCTION

Studying Natural Sciences (IPA) is very important. By studying science, students can master knowledge, facts, concepts, principles and discovery processes. Apart from that, it is also hoped that students have a scientific attitude so they can study the natural surroundings (Ningtiyas, AW, et al., 2022). Science learning cannot be separated from practical activities. This practicum activity can stimulate students to think critically and logically and encourage students to play an active role in learning activities to find out directly, provide experiences that can make a positive impression so that they can increase students' learning motivation. Practical activities allow students to gain direct experiments or experience and can measure students' scientific process skills (Hardianti, 2020).

Science process skills very important owned by student as provisions face demands of the era of globalization. On science process skills student trained think logical And critical in solve problem. Development ability think critical done with give indicators that can stimulate student think logically (Aghnafia , 2019). Science process skills are skills that scientists apply when conducting scientific research. This is also called science process skills (Syafi'ah R., et al., 2022)

skills really involve all students' abilities in acquiring knowledge based on phenomena. The students' abilities in question are the skills of observing, grouping, interpreting, predicting, asking questions, hypothesizing, planning experiments, applying concepts, communicating and carrying out experiments (Widyanti, et al. 2020). Quoted from (Sari et al., 2019) states that science skills are learning outcomes achieved by a person which include: the ability to carry out scientific work, communicate the results of scientific research and have a scientific attitude.

According to Lestari (2023), apart from science skills, understanding concepts is also the goal of a learning activity which can be seen from the increase in student learning outcomes. Learning outcomes relate to changes in knowledge, understanding, attitudes and behavior in students as a result of the learning they do . Learning outcomes are students' abilities obtained after learning activities have been carried out, namely everything achieved by students which is assessed in a certain way in accordance with the curriculum established by an educational institution. In general, learning outcomes are influenced by 3 factors, namely: (1) Internal factors (factors from within the student), namely the physical and spiritual condition of the student; (2) External factors (factors from outside the student), namely environmental conditions around the student; (3) Learning approach factors (approach to learning), namely a type of learning effort that includes strategies and methods used in learning activities (Budiarti, et al. 2022).

Selecting the right learning model very help teachers in reach success learning carried out (Laila P., 2019). In this research, the solution design is action in the form of applying the discovery learning model learning . Discovery learning model learning is one of the learning models recommended in the 2013 curriculum which refers to Minister of Education and Culture Regulation No. 103 of 2014. Discovery Learning can support students to have a scientific character , increase curiosity and social and independent behavior. This learning model is student-centered, in other words it encourages students to play an active role in learning activities because of the discovery learning model learning will condition students to understand concepts, meanings and relationships through an intuitive process to finally conclude (Khasinah S., 2021)

According to the PG Diknas Team (2020), the 2013 curriculum stipulates six stages of the Discovery learning model Learning , namely: (1) Stimulation or providing stimulation; (2) Problem statement or problem identification; (3) Data collection or collection of data and information; (4) Data processing or data processing; (5) Verification or analysis and interpretation of data (proof); and (6) Generalization or concluding. The aim of this research, namely improving the science skills and learning outcomes of class VIII students at MTs N 7 Sumedang, can be done using the discovery learning model learning.

METHODS

The research used is Classroom Action Research (PTK) which aims to improve the learning process in the classroom by improving and finding solutions to problems that occur. According to Azizah A., et al. (2021), classroom action research is a form of scientific study using certain methods carried out by teachers or researchers in the classroom which uses actions to improve learning processes and outcomes.

The solution design involves implementing the discovery learning model in teaching. This model uses a cyclical approach for each lesson, meaning the method applied in the first lesson is repeated in the second, with the only difference being the reflection, which varies based on the facts and data interpretations from each lesson. This approach aims to observe how effectively the discovery learning model improves science skills and student learning outcomes.

The research took place at MTsN 7 Sumedang, located in DSN Condong, Buahdua Village/District, Sumedang Regency. The school was selected because the researcher is a teacher there. The study was conducted from April to May 2023, focusing on the topic of additives. The participants were 25 eighth-grade students (13 male, 12 female), along with the class teacher and other colleagues.

Success in this study was measured by improvements in science skills and student learning outcomes, seen through increased class participation and better test scores compared to the previous year. Data was collected using both test and non-test methods. The test method involved question sheets, while the non-test method included observations and documentation. Observation sheets were used to assess student activity during the learning process.

These tests were designed to measure students' comprehension from the start to the end of the action cycle (Elisa, 2022). They also assessed students' learning outcomes through written tests, with formative analysis used to calculate percentages indicating students' mastery in Natural Sciences (IPA). Observations provided insights into teacher and student activities and the level of science skills students possessed. The scientific skills assessed included observing, collecting and processing data, and communicating results or conclusions.

The data was analyzed using descriptive statistical techniques by calculating the average science learning outcomes, which were then converted to a five-scale system to categorize learning outcomes. The action research was considered successful if 85% of students achieved a score of ≥75 (above the Minimum Completeness Criteria) and demonstrated active learning behavior. The scale guidelines can be seen in Table 1.

Table 1. Scale conversion guidelines for levels of science learning outcomes

Percentage of Achievement	Science Learning Outcome Category
90 – 100	Very high
80 – 89	High
65 – 79	Moderate
40 – 64	Low
0 – 39	Very Low

Equations

To determine the percentage of student learning outcomes, the researchers applied the formula: total achievement score divided by the maximum possible score, then multiplied by 100%.

$$\text{Percentage of Value} = \frac{\text{Total Score Obtained}}{Maximum\ Score} x\ 100$$

If the first action proves unsuccessful, it will proceed to a second action until the school environment is effectively utilized as a learning resource in science education, and the students' abilities align with the targeted outcomes set by the researcher, meeting the expected results of the intervention.

RESULT AND DISCUSSION

This research was carried out in two cycles with time allocated for each cycle for two meetings covering material on additives. Data collection techniques in this research were carried out using tests and non-tests. Tests are carried out to measure student learning outcomes in the form of written tests, while non-tests are carried out to measure the improvement in students' science skills through observing student activities.

Cycle I

Cycle I data can be seen on **Table 2.** From the list mark the obtained average value , sum students who reach the *KKM* (Kriteria Ketuntasan Minimal) or minimum competency standard, and amount students who don't reach KKM. In the learning process cycle I shows ability results Study student own average value 75, total There were 17 students who reached the KKM (68%), and those who had not capable 8 people (32%) reached the KKM .

Table 2. Results of Cycle I

Category	Quantity	Percentage (%)
Students Meeting KKM	17	68
Students Not Meeting KKM	8	32
Average Score**: 75**		

Students' science skills during the learning process can be observed in the results shown in Table 3. The observations can be grouped by the number of students who achieved a minimum score of 3 (the KKM) for each activity aspect, as well as the number of students who achieved an overall total score exceeding 9 (meeting the KKM). The observation results in Table 3 indicate that the highest number of students scoring a minimum of 3 excelled in the ability to identify samples according to test procedures. Additionally, more than half of the students demonstrated the ability to compare test results with the theoretical concepts found in the literature. On the other hand, the least developed science skill among students was presenting test results and engaging in discussions.

Table 3. Observation results for science skills of students in Cycle I

Data	Aspect 1 (Min. Score 3)	Aspect 2 (Min. Score 3)	Aspect 3 (Min. Score 3)	Science Skills (Score>9)
Number of Students	22	19	14	18
Percentage (%)	88	76	56	72

In Cycle I, the observation results for students' science skills focused on three key aspects. Aspect 1 involved students' ability to identify samples according to the correct testing procedures. Aspect 2 assessed their skill in comparing test results with foundational concepts in the literature. Aspect 3 evaluated students on presenting test results and engaging in discussion. Each of these aspects provided insight into different dimensions of students' scientific competencies and their ability to apply theoretical knowledge practically.

In Cycle I, several areas for improvement were identified. First, in the evaluation of learning outcomes, 32% of students had not achieved the minimum competency standard (KKM). This was partly due to insufficient motivational support from teachers, resulting in lower student performance. Second, the observation of students' science skills revealed that 28% of students were still passive, achieving only the minimum score of 3 in each learning activity. This lack of engagement was attributed to limited recognition and encouragement from teachers, which affected student participation. Finally, there was a lack of teacher-student interaction, which contributed to some students struggling to understand the procedural aspects of the activities.

Cycle II

To address the issues identified, several corrective actions will be implemented. First, teachers will provide more intensive motivation and guidance to students who do not yet fully understand the material. Second, teachers will offer additional recognition and encouragement to students who actively participate in the learning process. Third, teachers will take a more proactive approach in interacting with students, helping them feel more comfortable asking questions and gaining a better understanding of procedural activities.

The results from Cycle II, as shown in Table 4, include data on the average scores, the number of students who met the minimum competency standard (KKM), and those who did not. In the learning process of Cycle II, students demonstrated improved performance, with an average score of 80.2. The number of students who met the Minimum Mastery Criteria (KKM) reached 24, representing 96% of the class. Only one student (4%) did not meet the KKM, indicating significant progress compared to previous cycles.

Table 4. Results of Cycle II

Category	Quantity	Percentage (%)
Students Meeting KKM	24	96
Students Not Meeting KKM	1	4
Average Score **: 80,2**		

b. Skills Science Student

The science skills of students in Cycle II are reflected in the observation results presented in Table 5. These results categorize students based on those who achieved the minimum score of 3 (KKM) in each activity aspect and those who attained a total score of over 9, meeting the KKM threshold. The observation focused on three main aspects: Aspect 1, where students read the food composition on packaging samples; Aspect 2, which involved classifying types of additives in packaging samples and noting the negative impacts of excessive use; and Aspect 3, where students presented their discussion results.

The data in Table 5 shows that most students achieved the minimum score of 3 in reading food composition on packaging samples and classifying additives with their potential negative impacts. However, the skill with the lowest performance among students was presenting their discussion results, indicating an area where further improvement is needed.

The implementation of learning improvements in Cycle II led to a significant enhancement in student performance, both in overall learning outcomes and in the observed science skills. This improvement demonstrates the effectiveness of targeted interventions in helping students reach and exceed the minimum competency standard (KKM).

Table 5. Observation results for science skills of students in Cycle II

Data	Aspect 1 (Min. Score 3)	Aspect 2 (Min. Score 3)	Aspect 3 (Min. Score 3)	Science Skills (Score>9)
Number of Students	25	25	16	25
Percentage (%)	100	100	64	100

The learning improvement activities implemented have led to a significant increase in student performance from Cycle I to Cycle II. This improvement is evident in the comparison of student scores between the two cycles, as illustrated in Figure 1. The data clearly shows a marked advancement in student learning outcomes, highlighting the positive impact of the targeted interventions introduced in Cycle II.

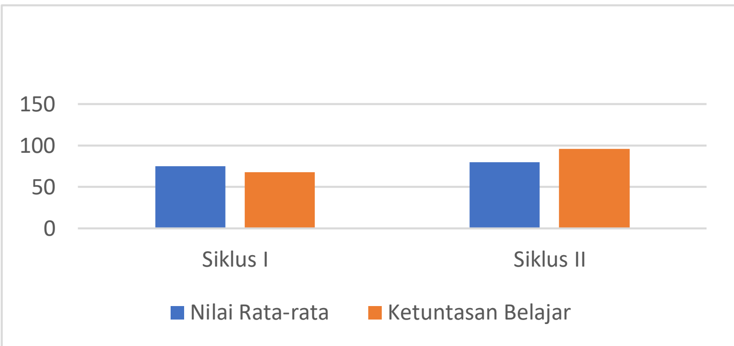

Figure 1. Chart of improvement in student learning outcomes from Cycle I to Cycle II

Figure 1 shows a noticeable increase in the average score from Cycle I to Cycle II. In Cycle I, the average score was 75, exactly meeting the minimum competency standard (KKM) for the chemistry subject in Class VIII at MTs N 7 Sumedang. By Cycle II, this average had risen to 80.2, surpassing the KKM. This improvement in learning outcomes is further reflected in the number of students who achieved the KKM, with learning completeness rising from 68% in Cycle I to 96% in Cycle II. This progress suggests that students began to grasp the material more effectively. The use of initial motivation and intensive mentoring played a substantial role in supporting students' understanding of the subject.

The learning activities in Cycle I and Cycle II were structured differently, which also influenced the evaluation indicators for students' science skills. Despite these differences, there was a clear improvement in students achieving the minimum score of 3 in each aspect across both cycles. The overall outcome indicates that a minimum competency level has been attained, as students' performance on science skills aligns with the required criteria for learning completeness. The cumulative minimum score of 9, derived from the three observed aspects, shows that students are meeting or exceeding the KKM. Figure 2 illustrates the number of students achieving a minimum score of 3 in each aspect across Cycle I and Cycle II.

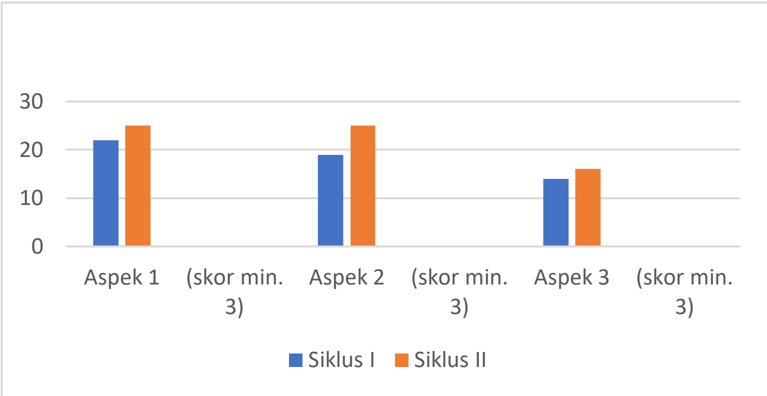

Figure 1. Number of Students Achieving a Minimum Score of 3 in Cycle I and Cycle II

In Cycle I, students demonstrated varying levels of scientific skills, with 22 students (88%) achieving the minimum score of 3 in Aspect 1. This number increased to 25 students (100%) in Cycle II. Aspect 2 also saw an improvement, rising from 19 students (76%) in Cycle I to 25 students (100%) in Cycle II. Similarly, Aspect 3 showed progress, with an increase from 14 students (56%) in Cycle I to 16 students (64%) in Cycle II, indicating overall growth in students' scientific skills across these aspects.

Achieving a minimum score of 9 across all scientific skills aspects serves as an indicator that students have met the minimum competency standard (KKM), equivalent to a score of 75. The number of students reaching this score rose from 18 (72%) in Cycle I to 25 (100%) in Cycle II. Additionally, the number of students actively participating in the learning process increased from 18 in Cycle I to the entire class in Cycle II, showing enhanced engagement and activity levels during learning sessions.

The improvement in students' scientific skills and engagement from Cycle I to Cycle II demonstrates the effectiveness of the discovery learning model in supporting chemistry instruction on additives. This aligns with previous research by Riyani A. (2023) in her study, conducted with Class VIII G at SMP Negeri 30 Semarang during the 2022/2023 academic year. Riyani's study found that science process skills improved from an average of 65.36 in Cycle I (categorized as Good) to an average of 86.98 in Cycle II (categorized as Very Good).

CONCLUSION

The results of learning activities over two cycles, along with thorough analysis, indicate that implementing the Discovery Learning model positively impacts students' learning outcomes and scientific skills. Evidence of this includes an increase in learning completeness from 60% in Cycle I to 90% in Cycle II and a rise in the number of students achieving top scores in science attitude assessments, from 7 students in Cycle I to 14 in Cycle II. For a more effective science learning process, it is recommended that teachers thoroughly prepare when implementing the Discovery Learning model, carefully selecting topics suited to this approach. Additionally, regularly engaging students with a variety of learning models, even at a basic level, can help them discover new concepts and skills essential for problem-solving. Given that this study was limited to MTsN 7 Sumedang, further research in diverse educational settings is encouraged to gain broader insights into the model’s effectiveness across different contexts.

REFERENCE

Azizah, A., & Fatamorgana, F. R. (2021). Pentingnya penelitian tindakan kelas bagi guru dalam pembelajaran. Jurnal Auladuna, 3(1). https://doi.org/10.36835/au.v3i1.475

Budiarti, R. S., Kurniawan, D. A., Septi, S. E., & Perdana, R. (2022). Perbedaan dan hubungan sikap dan self efficacy siswa perempuan dan laki-laki pada mata pelajaran IPA di SMP. Jurnal Pendidikan Sains Indonesia, 10(1), 73–88. https://doi.org/10.24815/jpsi.v10i1.21979

Elisa, E. (2022). Keterampilan proses sains. Educhannel. https://educhannel.id/blog/artikel/keterampilan-proses-sains.html

Fransiska, L. (2019). Pengaruh model pembelajaran guided discovery terhadap keterampilan proses sains siswa SMP Negeri 3 Sukasada. Jurnal Pendidikan dan Pembelajaran Sains Indonesia (JPPSI), 1(2), 68. https://doi.org/10.23887/jppsi.v1i2.17214

Hardiyanti, P. (2020). Analisis keterampilan proses sains melalui pembelajaran berbasis praktikum mata pelajaran IPA pada peserta didik kelas VIII di MTs Negeri 1 Bandar Lampung. (Skripsi, Fakultas Tarbiyah dan Keguruan Universitas Islam Negeri Raden Intan Lampung).

Khasinah, S. (2021). Discovery learning: Definisi, sintaksis, kelebihan, dan kelemahan. Jurnal Mudarrisuna: Media Kajian Pendidikan Agama Islam, 11(3), 43–54. https://doi.org/10.22373/jm.v11i3.5821

Laila, P. (2019). Pengembangan modul berbasis keterampilan proses sains sebagai bahan ajar dalam pembelajaran biologi. Jurnal Inovasi Pendidikan IPA, 5(1), 79–87.

Lestari, P. (2023). Pengaruh fasilitas belajar, motivasi belajar, dan disiplin belajar terhadap hasil belajar mata pelajaran humas kelas XI OTKP di SMKN Jakarta 11

Barat program studi pendidikan administrasi perkantoran fakultas ekonomi universitas negeri Jakarta. Jurnal Media Administrasi, 8(1), 35–47.

Ningtiyas, A. W., Aulia, A. S., & Rahmadhani, P. A. (2022). Penerapan pembelajaran IPA terpadu tingkat SMP kelas 8 sebagai landasan ketercapaian pembelajaran IPA. Jurnal Ilmiah Kependidikan, 9(3), 243–253.

Riyanti, A. (2023). Penerapan model discovery learning untuk meningkatkan keterampilan proses sains siswa SMP kelas VIII materi getaran dan gelombang. Proceeding Seminar IPA Universitas Negeri Semarang.

Sari, S. N., Supriyanti, F. T., & Dwiyanti, G. (2019). Analisis keterampilan proses sains pembelajaran larutan penyangga menggunakan siklus belajar hipotesis deduktif. EduChemia (Jurnal Kimia dan Pendidikan), 4(1), 77–88. https://doi.org/10.30870/educhemia.v4i1.4055

Syafi'ah, R., Laili, A. M., & Prisningtyas, N. V. (2022). Analisis komponen keterampilan proses sains pada buku ajar IPA kelas IX. Lensa (Lentera Sains): Jurnal Pendidikan IPA, 12(2), 87–96. http://jurnallensa.web.id/index.php/lensa

Tim PG Diknas Kementerian Pendidikan dan Kebudayaan. (2020). Pendidikan tentang model pembelajaran penemuan (discovery learning). Jakarta: Kementerian Pendidikan Nasional.

Widyanti, R., Distri, I. W., & Wahyudi, I. (2020). Pengaruh teknik pembelajaran pictorial riddle berbantukan LKPD berbasis inquiry learning terhadap keterampilan proses sains pada materi pemantulan cahaya. Jurnal Ilmu Pendidikan, 37(1), 37–45. https://doi.org/10.29303/jpft.v2i1.2