

Implementation of Discovery Learning Model with Concrete Media to Improve Problem Solving Skills and Cognitive Learning Outcomes of Mathematics in Grade IIIA Students of SDN 2 Dukuhwaluh

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ABSTRACT

This study aims to improve problem-solving skills and cognitive learning outcomes of students in mathematics and describe obstacles and solutions through the application of the Discovery Learning model with concrete media in class IIIA SDN 2 Dukuhwaluh. The background of this study is the low ability of students in solving problems and the achievement of cognitive learning outcomes in mathematics that are not optimal because learning is still conventional and does not involve students actively. The method used is Classroom Action Research (CAR) which is carried out in three cycles. Each cycle consists of planning, implementation, observation, and reflection stages. The subjects of this study were 26 students of class IIIA SDN 2 Dukuhwaluh. Data collection techniques used questionnaires and written tests. Data were analyzed descriptively quantitatively and qualitatively. The results of the study showed that the application of the Discovery Learning model with concrete media can improve problem-solving skills and cognitive learning outcomes in mathematics. The average problem-solving skills increased in cycle I = 83.24%, cycle II = 85.16%, and cycle III = 89.08%. The average percentage increase in cognitive learning outcomes in mathematics in cycle I = 76.92%, cycle II = 84.62%, and cycle III = 92.31%. This increase shows that the use of the Discovery Learning model with concrete media is effective in helping students understand the material in depth and actively solve problems. The obstacles found were the lack of initial understanding of students towards the problem and limited time in exploration. The solutions carried out include more intensive guidance for each group. The conclusion is that the application of the Discovery Learning Model with concrete media can improve Problem Solving Skills and Cognitive Learning Outcomes in Mathematics in Class IIIA Students of SDN 2 Dukuhwaluh.

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1. INTRODUCTION

Mathematics learning is very important to be taught to children starting from elementary school because mathematics is related to everyday life problems (Kumalasari, et al., 2024). Mathematics has an important role in forming logical, systematic, critical, and creative thinking patterns of students. Mathematics learning is not only

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aimed at mastering numerical concepts, but also at developing students' abilities in solving real-life problems effectively. Learning must also pay attention to the characteristics of students because it is related to choosing teacher strategies in implementing the learning process and student learning activities, especially in mathematics lessons that have abstract basic concepts. The existence of these difficulties makes students easily bored with following mathematics learning and like to play alone. Teachers need a method of delivery and presentation that begins with a real form before arriving at an abstract concept. In addition, a pleasant learning atmosphere is needed and can arouse interest in learning in elementary school students (Astini & Purwati, 2020).

Based on the results of initial observations conducted in class IIIA SDN 2 Dukuhwaluh, it shows that most students still have difficulty in understanding basic mathematical concepts and solving problems that require logical thinking. This can be seen from the low average score of daily tests and the large number of students who are unable to solve problem-solving-based questions. This is in line with the findings of Juniansyah, Hudaida, and Saputri (2024), which state that the low mathematics learning outcomes of students are partly due to the lack of variety in learning methods and the limited media used, so that students become passive and get bored quickly. Based on these problems, innovative and varied improvements are needed. The right learning model is needed to increase students' active participation and their ability to think critically and solve problems. One appropriate approach is the Discovery Learning model.

This model is a learning strategy that allows students to discover their own concepts or principles through the process of exploration, observation, experimentation, and analysis. According to Julaeah and Rosli (2022), the application of the Discovery Learning model can improve students' problem-solving abilities and learning motivation because it actively involves them in the learning process and encourages them to build their own knowledge. However, the implementation of the Discovery Learning model will be more optimal if supported by concrete learning media that are in accordance with the developmental characteristics of elementary school students. Concrete media can help students associate abstract concepts with real objects around them, making them easier to understand and remember.

This is reinforced by research by Hidayat, Salimi, and Suhartono (2023) which shows that the use of concrete media in mathematics learning can significantly improve student learning outcomes, especially in flat shape material which states that concrete media provides direct experience that accelerates students' understanding of the material. Concrete media is a learning aid that can be touched, seen, and manipulated directly by students. This media allows students to experience mathematical concepts directly in real form. Juniansyah, Hudaida, and Saputri (2024) in their research stated that concrete media can clarify the meaning of mathematical concepts and make learning more interesting and contextual.

Based on the background above, the researcher is interested in conducting classroom action research aimed at improving problem-solving skills through the application of the Discovery Learning model with concrete media about flat shapes, improving cognitive learning outcomes through the application of the Discovery Learning model with concrete media about flat shapes, and describing the obstacles and solutions to the application of the Discovery Learning model with concrete media to class IIIA students of SDN 2 Dukuhwaluh. This research is important because it answers the need for an innovative, fun, and appropriate learning approach to the characteristics of elementary school students. In addition, the results of this study are expected to contribute to the development of more effective and meaningful mathematics learning practices. The application of the Discovery Learning model with concrete media is a potential and unique strategy to create active, meaningful, and student-centered learning, and encourage students to find concepts independently.

1.1 Definition of Discovery Learning Model with Concrete Media

The Discovery Learning Model is a learning approach developed based on constructivist theory, which emphasizes the importance of active involvement of students in discovering knowledge independently. Through the stages of stimulation, problem identification, data collection, data processing, verification, and generalization, students are guided to build their own understanding of the concepts being studied. This model has proven effective in developing critical thinking skills and problem-solving abilities because it trains students to examine problems and draw conclusions independently (Ramadhani & Ratnawulan, 2022). Concrete media is a learning aid that is real and can be touched or manipulated directly by students. The use of concrete media is very appropriate for the characteristics of elementary school students who are at the concrete operational stage according to Piaget's theory. This media helps students understand abstract concepts, increases learning focus, and facilitates more meaningful learning experiences.

Research by Nuriya and Setiyawati (2021) shows that the use of concrete media significantly improves students' understanding of concepts and cognition because the learning process becomes more contextual and interactive. The combination of the Discovery Learning model and concrete media has been proven to improve problem-solving skills and cognitive learning outcomes of elementary school students. Husni, Suryawan, and Rahmawati (2022) in their research found that students who learned with this model showed a significant increase in their ability to identify, analyze, and solve science problems, and experienced an increase in the average score of learning outcomes. Meanwhile, research by Gazali and Pransisca (2022) in the context of third grade elementary

school mathematics learning showed that the use of Discovery Learning assisted by real object media was able to increase cognitive learning completeness from 30.8% to 84.6%, as well as improve students' ability to solve problem-solving questions.

Research by Baramukti et al. (2023) on spatial geometry material also strengthens the finding that this approach is very effective in developing students' critical thinking and mathematical problem-solving skills, especially because concrete media makes geometric concepts easier to understand. A meta-analysis by Ramadhani and Ratnawulan (2022) supports this by showing that Discovery Learning has a significant impact on improving students' cognitive learning outcomes and higher-order thinking skills, especially when combined with visual aids or real objects. These findings prove that the application of the Discovery Learning model with concrete media not only improves cognitive understanding but also fosters essential skills in solving problems systematically and logically.

“Discovery Learning Model with concrete media is an effective learning model to improve problem-solving skills and cognitive learning outcomes of elementary school students. Through the process of discovery and use of real aids, students find it easier to understand abstract concepts actively and meaningfully and students can find learning concepts independently.”

1.2 Problem Solving Skills and Cognitive Learning Outcomes

Problem-solving skills are one of the core competencies required in 21st-century learning. In the context of elementary education, these skills include students' ability to identify problems, seek relevant information, develop alternative solutions, and make logical decisions. According to Apriani, Sulisty, and Lestari (2020), problem-solving not only strengthens conceptual understanding but also trains critical and creative thinking skills, two important elements in the profile of 21st-century learners. Therefore, it is important for teachers in grade III of elementary school to integrate learning activities that require students to actively think, explore, and solve problems independently. Cognitive learning outcomes are part of the Bloom's taxonomy domain that focuses on aspects of knowledge, understanding, and application. In 21st-century education, cognitive learning outcomes are not only measured by the ability to remember facts, but also the extent to which students are able to relate, reason, and apply their knowledge in various real-life contexts (Suryani & Ramdani, 2021).

To achieve meaningful learning outcomes, teachers need to provide contextual, collaborative, and project-based learning, which allows students to learn while developing high-level cognitive skills such as analysis and evaluation. Problem-solving skills and cognitive learning outcomes are strongly related in shaping the profile of capable and adaptive 21st-century students. Research by Baramukti et al. (2023) shows that the application of the Discovery Learning model assisted by concrete media can simultaneously improve both aspects in learning spatial mathematics. By using real objects that can be observed and manipulated, students are invited to explore and draw conclusions from direct experiences. This is in line with the principles of 21st-century learning which emphasize active learning, real problem solving, and full student involvement. Gazali and Pransisca (2022) also found that the Discovery Learning approach with real object media had a significant impact on learning completeness and the ability to solve problem-based mathematics problems.

Learning that is designed with an emphasis on investigation, collaboration, and reflection which are the main characteristics of 21st century learning not only improves academic achievement but also develops students' reasoning and learning independence. Therefore, learning in grade III of elementary school needs to be designed creatively and innovatively in order to equip students with relevant thinking and learning skills to face future challenges.

2. Implementation of Discovery Learning Model with Concrete Media to Improve Problem Solving Skills and Cognitive Learning

Problem-solving skills are one of the high-level thinking skills (HOTS) that are very important in learning mathematics in the 21st century. This ability involves a systematic thinking process to understand, analyze, and solve problems based on concrete data or experiences. According to Rachmawati and Surya (2023), the application of learning models that provide space for exploration, such as Discovery Learning, is very effective in developing problem-solving skills because it encourages students to be actively involved in building understanding through direct experience. This is very relevant for elementary school students who are still at the concrete operational development stage. Cognitive learning outcomes are also the main focus in evaluating learning effectiveness, because they reflect the level of concept mastery and students' understanding of the material being taught. Based on Bloom's taxonomy, cognitive learning outcomes include the ability to remember, understand, apply, analyze, evaluate, and create.

Suryani and Ramdani (2021) stated that learning strategies that allow students to learn actively and contextually tend to result in improvements in students' cognitive aspects. Therefore, the integration of exploratory learning models with the use of concrete media is highly recommended to encourage more optimal learning outcomes. The results of the study in class IIIA SDN 2 Dukuhwaluh showed that the application of the Discovery

Learning model with concrete media was able to improve students' problem-solving skills in mathematics learning, especially in flat shape material. Based on observation data for three cycles, there was an increase in the average achievement from 83.23% to 88.97%. This increase occurred gradually in each step of the model, starting from problem identification, information analysis, solution formulation, implementation, to evaluation. This shows that concrete media such as teaching aids or real objects can help students understand problems more clearly and interestingly (Arifin & Wahyuni, 2023; Fitriani, 2023).

In addition to improving problem-solving skills, students' cognitive learning outcomes also showed a positive trend. The average score increased from 76.15 in cycle I to 86.31 in cycle III, and learning completeness increased from 69.23% to 92.31%. This improvement is inseparable from the improvement of learning strategies carried out reflectively in each cycle, including the selection of relevant media, evaluation designs that measure conceptual understanding, and increasing student involvement in the learning process. Thus, the Discovery Learning model assisted by concrete media has proven effective in improving the quality of mathematics learning in elementary schools, both in terms of the process and student learning outcomes.

3. DISCUSSIONS

The implementation of the Discovery Learning model assisted by concrete media has proven effective in improving problem-solving skills and cognitive learning outcomes of class IIIA students of SDN 2 Dukuhwaluh. Learning carried out through active exploration stages such as problem identification, information analysis, solution formulation, implementation, and reflection is able to form critical and logical thinking patterns in students. Concrete media plays an important role in bridging abstract mathematical concepts, such as flat shapes, with real experiences that are easy for students to understand. The increase in student achievement at each stage shows that this model not only fosters active participation, but also strengthens understanding of concepts in depth and contextually.

Conclusion, the increase in the average value of cognitive learning outcomes and the percentage of student completion from cycle I to cycle III indicates that this learning model is running effectively and systematically. Continuous reflection and improvement carried out in each cycle also contribute to overcoming obstacles such as low motivation, limited learning media, and less than optimal evaluation. Thus, Discovery Learning with concrete media can be an alternative learning strategy that is able to develop high-level thinking skills and improve the academic achievement of elementary school students.

REFERENCES

- Apriani, R., Sulistyo, B., & Lestari, I. (2020). *Peningkatan keterampilan pemecahan masalah matematis melalui model pembelajaran berbasis masalah di sekolah dasar*. *Jurnal Ilmiah Sekolah Dasar*, 4(2), 233–240.
- Astini, N. W., & Purwati, N. K. R. (2020). Strategi Pembelajaran Matematika Berdasarkan Karakteristik Siswa Sekolah Dasar. *Jurnal Edukasi Matematika Dan Sains*, 9(1), 1–8.
- Baramukti, I. M., Rokhmaniyah, & Suhartono. (2023). *Penerapan Discovery Learning dengan media konkret materi bangun ruang untuk meningkatkan keterampilan pemecahan masalah dan hasil belajar siswa*. *Kalam Cendekia: Jurnal Ilmiah Kependidikan*, 11(1), 55–65.
- Gazali, M., & Pransisca, M. A. (2022). Penerapan Model Discovery Learning Berbantuan Media Benda Nyata Dalam Meningkatkan Hasil Belajar Matematika Pada Siswa Kelas III SD. *BADA'A: Jurnal Ilmiah Pendidikan Dasar*, 4(1), 14–24.
- Hidayat, Z., Salimi, M., & Suhartono, S. (2023). Peningkatan Hasil Belajar Matematika tentang Bangun Datar pada Siswa Kelas III SD Menggunakan Model Discovery Learning dengan Media Konkret. *Kalam Cendekia: Jurnal Ilmiah Kependidikan*, 11(3).
- Juniansyah, D., Hudaida, H., & Saputri, H. (2024). Penerapan Media Konkret dalam Upaya Meningkatkan Hasil Belajar Matematika Siswa Kelas 5 SD Negeri 47 Palembang. *Journal on Education*, 7(1), 6449–6459.
- Julaeha, J., & Rosli, R. (2022). Penerapan Discovery Learning untuk Meningkatkan Kemampuan Pemecahan Masalah dan Motivasi Belajar Matematika Siswa. *Pasundan Journal of Mathematics Education: Jurnal Pendidikan Matematika*, 12(2).
- Kumalasari, L., Mulyanti, W. S., & Sakdiyah, S. H. (2024, October). Penerapan Model Discovery Learning Berbantuan Media Konkret dalam Meningkatkan Hasil Belajar Matematika pada Siswa Kelas IV di Sekolah Dasar. In *Seminar Nasional dan Prosiding PPG Unikama* (Vol. 1, No. 2, pp. 2641–2653).
- Rachmawati, L., & Surya, E. (2023). Pengembangan kemampuan berpikir kritis siswa melalui model discovery learning pada materi geometri. *Jurnal Matematika dan Pembelajaran*, 11(1), 25–34.

- Suryani, R., & Ramdani, A. (2021). *Evaluasi hasil belajar kognitif menggunakan taksonomi Bloom pada pembelajaran tematik di SD*. *Jurnal Pendidikan Dasar Nusantara*, 7(1), 12–21.
- Wahyuni, R. S., Arifin, S., Puspitasari, I., Astiswijaya, N., Santika, N. W. R., Oktaviane, Y., ... & Kusumastiti, W. (2024). Model-model pembelajaran.