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Application of Discovery Learning with Flashcard Media to Increase Active Mathematics Learning Madrasah Ibtidaiyah students

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ABSTRACT
This research aims to evaluate the mathematics learning process with a discovery learning model using flashcard media for class IV students at MI Al-Ma'arif 02 Jombang-Jember and identify their weaknesses and strengths. The approach used is descriptive qualitative with purposive techniques for determining subjects. Data was collected through passive participant observation, semi-structured interviews, and documentation, then analyzed using Miles and Huberman's interactive analysis model and tested for validity through triangulation of sources and techniques. The research results show that teachers prepare lesson plans, syllabi, media, and learning resources in planning learning. Implementing learning includes opening, core (with discovery learning syntax), and closing. Learning evaluation is carried out by assessing knowledge, attitudes, and skills. The advantages are that students become more active and enthusiastic, the material is easier for the teacher to convey, and it is easier for students to understand the material and work on questions. However, some students were less enthusiastic and needed help understanding the material, so they needed help answering the questions.

INTRODUCTION

The problem of mathematics learning at the Madrasah Ibtidaiyah (MI) level is a complex issue that requires a comprehensive approach (Waskitoningtyas, 2016). One of the main problems is students' low interest and motivation towards mathematics. Abraham Maslow's motivation theory, with the Hierarchy of Needs, provides an in-depth view of this problem. According to Maslow, individuals have five needs that must be met to achieve maximum motivation, from physiological needs to self-actualization (Perdana, 2020). In the educational context, MI students have difficulty achieving motivation to learn because their basic needs, such as security and social support, have not been adequately met in the school or family environment. For example, suppose students do not feel emotionally safe in the classroom, perhaps due to excessive academic pressure or lack of support from teachers. In that case, they will have difficulty achieving higher motivation needs such as esteem and self-actualization. Therefore, teachers and parents need to create a supportive and safe environment to increase motivation to learn mathematics, including providing emotional support, positive reinforcement, and an inclusive classroom atmosphere.

Apart from that, the constructivism theory pioneered by Jean Piaget is also relevant to understanding this problem. According to Piaget, children learn by building new knowledge based on previous experiences (Ramadhan & Usriyah, 2021). In this case, teaching methods that are too didactic and less interactive often fail to meet the learning needs of students at MI because they need to consider how they build knowledge. Teachers need to use a more contextual and meaningful approach for students, such as using props and educational games and applying mathematical concepts to everyday situations. A study by Ruseffendi showed that students who

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studied mathematics with a more contextual and interactive approach showed a significant increase in understanding

compared to students who studied through conventional methods. (Dina et al., 2019). This supports the argument that mathematics learning must be designed to involve students in the teaching and learning process more actively. This approach also aligns with Vygotsky's learning theory, which emphasizes the importance of social interaction and scaffolding in children's cognitive development (Flora et al., 2020). Contrary to the optimistic view about effective mathematics learning, the reality at Madrasah Ibtidaiyah Al-Ma'arif 02 Jombang-Jember shows that mathematics is still a frightening threat for fourth-grade students. Students at this school consider mathematics a problematic subject, perceived as a dry, conceptual, and theoretical science. Students feel intimidated by the many symbols and formulas considered complicated and confusing. In addition, unpleasant and often dull teaching methods exacerbate the situation, creating a tense classroom atmosphere during mathematics lessons. This condition contributes to students' low learning motivation, which can even develop into hatred towards mathematics. This negative perspective shows that there are still significant challenges in changing how mathematics is taught to make it more exciting and easy to understand, especially at Madrasah Ibtidaiyah Al-Ma'arif 02 Jombang-Jember (Zahara et al., 2020)

Mathematics learning activities feel fun and run optimally when students actively participate in learning. One learning model that makes students actively participate in learning is the discovery learning model. Discovery learning is a learning strategy that directs students to conduct observations, trials, or scientific activities. Through this model, participants are directed to obtain their findings based on what they have learned and then construct them by understanding their meaning (Perdana, 2020).

The use of the discovery learning model is also emphasized by the Ministry of Education and Culture in Minister of Education and Culture Regulation number 65 of 2013 concerning standard procedures for primary and secondary education, which emphasizes implementing the discovery learning model or disclosure-oriented learning. This aims to strengthen the scientific approach to teaching and learning activities and to develop students' skills. (Puspitasari et al., 2022) Apart from using learning models, learning activities also require good learning media. Therefore, to balance learning and learning media, both should support each other. M. Yaumi explained that learning media are all physical objects created intentionally to convey explanations and form correlations. The physical objects in question include natural objects, printed materials, audio-visual, multimedia, and the web. These objects must be able to be used to convey explanations containing learning materials so that students can build knowledge well and efficiently. (Yowaboot & Sukying, 2022). Researchers have conducted studies related to previous research regarding flashcard media. Research conducted by Febiola shows that flashcard media can increase students' activeness and creative thinking abilities (Febiola, 2020). Likewise, this research focuses on implementing the Discovery Learning model based on Flashcard Media to foster student activity, especially in mathematics learning.

RESEARCH METHODS

This research utilizes a qualitative approach, which is chosen based on the objectives of the study. The qualitative method aims to produce descriptive data in the form of written or spoken words from the research subjects, reflecting their behavior as observed by the researcher (Sugiyono, 2013). The type of research applied is descriptive qualitative research, meaning the data collected will be presented in the form of words rather than numbers, providing a detailed and factual description of the findings in the field. The subjects in this study were selected using a purposive sampling technique, a deliberate method where participants are chosen based on specific categories relevant to the research goals (Winarni et al., 2020).

To collect the data, three main techniques were employed: passive participant observation, semi-structured interviews, and documentation. In passive participant observation, the researcher

observes without directly engaging with the subjects, allowing natural behavior to unfold (Creswell, 2014). Semi-structured interviews provided a flexible yet focused method of obtaining in-depth information (Kvale & Brinkmann, 2009), while documentation involved gathering relevant written and visual records to support the study (Bowen, 2009). Data analysis followed the interactive analysis model proposed by Miles and Huberman (1994), consisting of three stages: data condensation, data presentation, and conclusion drawing. In the data condensation stage, the data was summarized and focused on relevant aspects of the research. The condensed data was then organized and displayed clearly during the presentation stage, leading to the final phase of drawing conclusions, where patterns and insights were identified and verified through further analysis. The validity of the data was ensured through source and technique triangulation, where information was cross-verified by comparing data from multiple sources and using different collection techniques, ensuring the reliability and accuracy of the findings (Patton, 2002).

RESULTS AND DISCUSSION

Discovery Learning Planning with Flashcard Media in Mathematics Learning at Madrasah Ibtidaiyah

Before the learning process begins, teachers must prepare a comprehensive learning plan through a structured mechanism, often in collaboration with the Madrasah Principal, to ensure the proper implementation of the learning activities. This preparation involves developing a learning plan that acts as a guide for teachers in executing the learning process and conducting assessments. The learning plan typically includes documents such as proposals, promissory notes, and lesson plans (Rencana Pelaksanaan Pembelajaran or RPP). According to Rayuni (2010), the stages of learning planning start with the preparation of the annual program (program tahunan or porta) and the semester program (program semester or promissory notes). These are followed by the development of the syllabus and the RPP, aligned with a systematic approach that integrates various learning components (Koto, 2020).

This approach is consistent with the findings from observations, interviews, and documentation with fourth-grade mathematics teachers and the Head of Madrasah Ibtidaiyah Al-Ma'arif 02 Jombang. It was revealed that teachers, aside from creating lesson plans, also prepare other essential components such as the porta, promissory notes, syllabi, and detailed lesson plans. The preparation of these learning tools is conducted two weeks before the commencement of teaching and learning activities. These tools serve as a foundation for ensuring that the learning process is well-structured and aligns with both educational goals and curriculum requirements. Additionally, teachers determine the appropriate learning models or methods to make the lessons more engaging for students. For instance, the fourth-grade mathematics teacher uses the discovery learning model, a student-centered approach where students actively explore and construct knowledge through problem-solving and investigation. This model is well-suited to promote active engagement, making the learning experience more enjoyable and effective.

Firman et al. argue that mathematics learning, especially in elementary schools, should be designed to be enjoyable, often referred to as joyful learning. Various approaches can be employed to achieve this, and these approaches align with the principles of the 2013 curriculum. Examples include Realistic Mathematics Education (RME) or the Indonesian Realistic Mathematics Learning (PMRI), problem-solving, project-based learning, discovery learning, and STEM learning (Science, Technology, Engineering, and Mathematics) (Ramadhan & Hidayah, 2022). These methods not only encourage student participation but also foster a deeper understanding of mathematical concepts in real-world contexts. The use of discovery learning in particular encourages students to be inquisitive, actively solve problems, and develop critical thinking skills, which are essential components of modern educational paradigms.

In addition to preparing lesson plans and selecting appropriate learning models, teachers at MI Al-Ma'arif 02 Jombang also focus on the preparation of learning resources and learning media. Learning resources for the fourth-grade mathematics teachers include textbooks, worksheets, and

online resources, which help in making the learning experience comprehensive and diverse. By utilizing these resources, teachers can offer varied content and activities that cater to different learning styles, ensuring that all students can engage with the material effectively.

The use of learning media is also crucial in enhancing the learning process. Teachers at MI Al-Ma'arif 02 Jombang employ media such as flashcards, picture cards, and natural objects. This aligns with of Utami (2018) perspective that learning media encompasses various physical tools and materials that are systematically designed to deliver information and foster interaction. These tools include original objects, printed materials, audio-visual equipment, multimedia resources, and web-based platforms. Learning media serve as conduits for conveying educational messages, allowing students to interact with and internalize knowledge more effectively and efficiently. Using tangible media such as flashcards and natural objects in mathematics allows students to visualize abstract concepts, thereby making the subject more accessible and engaging.

In conclusion, the preparation of learning plans, resources, and media by the fourth-grade mathematics teachers at MI Al-Ma'arif 02 Jombang reflects a holistic approach to education. By integrating discovery learning with well-prepared resources and media, teachers create a dynamic and enjoyable learning environment. This strategy aligns with the principles of the 2013 curriculum, promoting student involvement and making mathematics both accessible and enjoyable for young learners.

Implementation of Discovery Learning using Flashcard Media in Mathematics Learning at Madrasah Ibtidaiyah

Preliminary activities serve as an essential foundation for the learning process, aimed at mentally and physically preparing students for the acquisition of new knowledge. In the context of fourth-grade mathematics lessons at Madrasah Ibtidaiyah Al-Ma'arif 02 Jombang, interviews, observations, and documentation show that teachers begin by checking students' attendance and asking about their well-being. This seemingly simple step has a deeper pedagogical purpose; by engaging students personally, the teacher creates a comfortable and welcoming environment, which is key to fostering student participation and motivation (Dewey, 1938). As Rahtika et al. (2022) suggest, preparing students psychologically and physically is essential in ensuring that they are ready to fully engage in learning. Moreover, by linking prior knowledge to new material through a series of questions (apperception), teachers build cognitive bridges that aid the students' understanding of more complex concepts (Shulman, 1987).

The motivation provided by the teacher in the preliminary activities plays an equally critical role. Motivating students helps to create a positive attitude toward learning, especially in subjects like mathematics, which some students may find challenging. This process aligns with the framework suggested by Rahmatika et al. (2022), emphasizing the importance of conveying learning objectives and the broader scope of material. Clearly defining what will be achieved during the lesson allows students to have a sense of direction and purpose, which enhances their engagement (Gagné, 1985; Reiser, 2012).

In the core activities, the teacher employs the discovery learning model, a student-centered approach that encourages inquiry-based learning. This model shifts the role of the teacher from being the sole source of information to a facilitator who guides students as they actively engage with the material (Bruner, 1961). The teacher's role in providing an initial stimulus through learning media, such as flashcards and protractors, is a well-executed strategy that draws upon students' natural curiosity. By encouraging students to formulate questions based on the stimuli, the teacher not only activates prior knowledge but also promotes higher-order thinking skills, such as analysis and evaluation, as the students must think critically to create meaningful questions (King, 1994).

A key strength of this method lies in the students' active participation in discovering knowledge themselves. This discovery process is supported by steps such as group discussions and comparison of answers, which not only encourage collaboration but also foster deeper understanding. As Vygotsky's theory of social constructivism emphasizes, learning occurs through social interaction, and group work in this model enhances peer learning (Vygotsky, 1978).

Moreover, the use of hands-on tools such as protractors reinforces students' understanding by allowing them to directly interact with the learning materials, which is particularly effective in mathematics education where abstract concepts often require concrete representation for students to fully grasp them (Fosnot & Dolk, 2001).

However, while the discovery learning model offers significant advantages in terms of fostering critical thinking and student engagement, there are also potential challenges. One concern is that this model may place high cognitive demands on students, especially those who struggle with mathematics or have less-developed problem-solving skills (Mayer, 2004). Without sufficient guidance or scaffolding, these students may become frustrated, which could hinder their learning experience. To address this, the teacher must ensure that adequate support is provided, such as offering additional hints or breaking down complex tasks into smaller, more manageable steps (Wood et al., 1976). This is crucial to ensure that all students, regardless of their academic abilities, can benefit from this learning approach.

Additionally, there is a need for careful classroom management during discovery learning. Because the model promotes exploration and discussion, there is a risk that some students may become off-task or that certain groups may dominate the discussions, limiting the participation of quieter or less confident students (Gillies, 2004). To mitigate this, the teacher needs to actively monitor group work, ensuring that all students contribute and that the discussions remain focused on the learning objectives.

The final stage of the learning process, where students present their conclusions and compare their answers to the book's material, is an excellent opportunity for reflective learning. By reflecting on their findings and comparing them with authoritative sources, students are engaged in metacognitive processes, which help solidify their understanding and improve future learning (Flavell, 1979). Furthermore, the teacher's role in providing feedback at this stage is critical. Timely and constructive feedback allows students to correct misconceptions, further clarify their understanding, and gain confidence in their abilities (Hattie & Timperley, 2007). The feedback process also encourages a growth mindset, as students see mistakes not as failures but as valuable learning opportunities (Dweck, 2006).

In conclusion, the use of discovery learning in fourth-grade mathematics at Madrasah Ibtidaiyah Al-Ma'arif 02 Jombang reflects a well-considered application of modern pedagogical principles. By engaging students in active learning, encouraging inquiry, and fostering collaboration, the teacher effectively makes the learning process more enjoyable and meaningful. However, to optimize the effectiveness of this approach, careful attention must be paid to providing scaffolding, managing classroom dynamics, and ensuring that all students are supported throughout the discovery process. When executed properly, the discovery learning model has the potential to significantly enhance student outcomes in mathematics education by promoting critical thinking, problem-solving, and deeper understanding of key concepts.

Evaluasi *Discovery Learning* dengan Media *Flashcard* pada Pembelajaran Matematika di Madrasah Ibtidaiyah

Closing activities play a critical role in the overall learning process, as they help consolidate the knowledge gained, provide reflection opportunities, and set the stage for future learning. In the case of the fourth-grade mathematics class at Madrasah Ibtidaiyah Al-Ma'arif 02 Jombang, the teacher effectively ended the lesson by guiding the students in drawing conclusions and reflecting on the lesson's content. This reflection allows students to assess their understanding and solidify key concepts they have learned. It also encourages a habit of metacognitive thinking, where students evaluate their learning process, thus enhancing retention and comprehension (Flavell, 1979).

One of the key elements of the closing activities is summarization. As noted by Febriyanto and Yanto (2019), a teacher must actively engage students in summarizing the learning objectives, main keywords, and mathematical ideas discussed. In this case, the teacher followed the guideline

by summarizing the angle measurement material and ensuring students reflected on the learning outcomes. Furthermore, by inviting students to pray together at the end of the session, the teacher also fostered a positive, respectful, and reflective classroom environment, reinforcing values alongside academic content. Following:

Activeness of Class IV A1 Students		
No.	Category	Percentage
1	Very active	31%
2	Active	56%
3	Quite active	13%
4	Less active	-
5	Very less active	-
Average value		84

Class IV A2 Student Activity		
No.	Category	Percentage
1	Very active	35%
2	Active	53%
3	Quite active	12%
4	Less active	-
5	Very less active	-
Average value		85

From the existing data, 13% of class IV A1 students are pretty active, 56% are active, and 31% are very active. The average final student activity score is 85, which means it is in the active category, with 12% quite active, 53% active, and 35% very active. The use of discovery learning models and flashcard media makes it easier to convey and understand the material and work on questions. However, some students are less active and prefer to play alone, so they need help understanding the material. In the knowledge assessment, in class IV A1, nine students got a score above the KKM, 3 got a score just above the KKM, and four got below the KKM. In class IV A2, 12 students got a score above the KKM, 1 got a score just above the KKM, and four got below the KKM. This shows that there are still students who have not completed their mathematics learning, as in the data below:

Knowledge Assessment Data for Class IV A1 Students

No.	Rating result	Number of students
1	Value above KKM	9
2	KKM pass value	3
3	Value below KKM	4
Amount		16

Knowledge Assessment Data for Class IV A2 Students

No.	Rating result	Number of students
1	Value above KKM	12
2	KKM pass value	1
3	Value below KKM	4
Amount		17

The fourth-grade mathematics teacher also explained this in the post-observation interview. Due to limited time, the teacher paid less attention to the students one by one. Teachers also have to deliver material in only one meeting. Even though there is little time, the teacher still makes every effort to explain the material to students who do not understand it and have difficulty working on the questions.

The evaluation and assessment conducted by the teacher also play a crucial role in closing activities. According to Febriyanto & Yanto (2019), assessment should be systematic and consistent, allowing teachers to gauge student performance and identify those in need of additional support. The teacher at MI Al-Ma'arif 02 Jombang conducted this evaluation by giving students follow-up assignments and conducting a formal knowledge assessment. The data showed that, in class IV A1, nine students scored above the minimum competency criteria (KKM), while four students scored below it. Similarly, in class IV A2, 12 students scored above the KKM, while four students scored below. These results highlight that a significant proportion of students are performing well, yet there are still several who require additional support.

The knowledge assessment results also highlight a gap in student performance. While most students performed well, a number of them fell below the KKM. In class IV A1, nine students exceeded the KKM, while four students fell below it. Similarly, in class IV A2, 12 students scored above the KKM, while four did not meet the benchmark. This discrepancy suggests that some students may require additional support, whether through remedial instruction or more personalized attention. During post-observation interviews, the teacher acknowledged that time constraints posed a significant challenge to delivering the material effectively. Teachers often had to cover the material in a single meeting, which limited their ability to provide individualized support to struggling students. Time management is a common issue in many educational settings, especially when teachers are required to follow a strict curriculum schedule (Pacing Guides). In this case, while the teacher made efforts to explain difficult material to those who needed it, the limited time affected the depth and quality of instruction. According to Gagné (1985), adequate instructional time and opportunities for practice are essential for ensuring mastery of concepts, particularly in subjects like mathematics that require conceptual understanding and problem-solving skills.

Given the findings, several potential improvements could significantly enhance the effectiveness of the closing activities and the overall learning process. Remedial support and differentiation are critical for students who do not meet the minimum competency criteria (KKM). To support these students, teachers could implement targeted strategies such as after-school tutoring, remedial sessions, or more individualized feedback during class. Additionally, differentiated instruction techniques, as suggested by Tomlinson (2001), could ensure that students of varying ability levels can engage with and understand the material more effectively. This approach allows the teacher to cater to the unique needs of each student, ensuring that no one is left behind. Moreover, improving time management and curriculum flexibility could alleviate some of the pressure associated with covering material in a limited time. Teachers could design more flexible lesson plans or break complex topics into multi-part lessons, allowing students more time to engage deeply with the material. As Hiebert and Grouws (2007) suggest, this approach would provide students with sufficient time to grasp challenging concepts while ensuring that the teacher can maintain a balanced curriculum pace. Such flexibility could also improve comprehension, particularly for more difficult mathematical topics.

In addition to managing time effectively, providing active monitoring and scaffolding for students who are less engaged is essential. Some students may require more structured guidance or closer monitoring to remain focused on the tasks at hand. Teachers could assign specific tasks to disengaged students to keep them on track and actively involve them in the learning process. Structured peer support, such as pairing low-engaged students with more engaged classmates, could also create a more inclusive and collaborative learning environment, as supported by Vygotsky's (1978) theory of social constructivism. Lastly, enhancing reflective practices within the closing activities could further deepen students' understanding. While reflection was already a part of the current process, a more structured approach might be beneficial. Teachers could provide reflection prompts or encourage students to write about their learning experiences, challenges, and areas for improvement. As Flavell (1979) notes, metacognitive reflection encourages students to take ownership of their learning process, allowing them to become more self-aware and proactive in addressing their educational needs. Through these improvements, the effectiveness of both the closing activities and the overall learning process could be greatly enhanced.

CONCLUSION

Based on the results of the presentation and analysis of research findings, the mathematics learning process using the discovery learning model and flashcard media for class IV students involves several essential activities. At the planning stage, the teacher prepares a Learning Implementation Plan (RPP) and syllabus two weeks before learning begins, using a discovery learning model supported by flashcard media, mathematics worksheet books, textbooks, and the Internet as learning resources. The implementation of learning begins with prayer together,

followed by apperception to condition the students. The core learning activities involve applying the stages of the discovery learning model, which include stimulation, problem identification, data collection, data processing, proof, and conclusion. Closing activities involve summarizing learning results, reflection, evaluation, giving follow-up tasks, and praying together. Learning evaluation is carried out through written tests and assessment of attitudes and skills.

For further research, it is recommended to focus on strategies to increase the learning motivation of less enthusiastic students. This can be done by integrating more varied and interactive learning methods, such as digital media or educational games that attract students' attention. In addition, special efforts need to be made to support students who have difficulty understanding the material, such as through additional guidance or more intensive group study sessions. Research could also explore the influence of parental involvement in the home learning process on students' academic achievement. Using more diverse and innovative learning media and ongoing assessments that continuously monitor student progress is essential to ensure more effective and comprehensive learning. Thus, using the discovery learning model, mathematics learning can provide more optimal and equitable results for all students.

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