Improving Science Learning Outcomes through an Environment-Based Discovery Learning Model

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Abstract: This study aims to (1) describe teacher activities, (2) describe student activities, and (3) analyze student learning outcomes through the implementation of an environment-based Discovery Learning model. This research is a Classroom Action Research (CAR) conducted in two cycles, involving 34 fifth-grade students as research subjects. Data collection techniques included observation and tests, with instruments in the form of observation sheets for teacher and student activities and learning outcome evaluation questions. The results showed an increase in teacher activity from 76.56% (good category) in Cycle I to 91.40% (very good category) in Cycle II. Student activity also increased from 75.78% (good category) in Cycle I to 90.62% (very good category) in Cycle II. In addition, student learning outcomes improved from 58.82% (not yet complete) in Cycle I to 91.17% (complete) in Cycle II. Thus, the implementation of the environment-based Discovery Learning model was able to create an active, enjoyable, and meaningful learning atmosphere. It can be concluded that the environment-based Discovery Learning model is effective in improving student activities and learning outcomes of fifth-grade students in the IPAS subject at MIN 31 Aceh Utara.

Keywords: Discovery Learning Model, Environment-Based Learning, Learning Outcomes.

INTRODUCTION

The learning process is an activity that results in changes in students' behavior as an impact of learning experiences through interaction with the surrounding environment. These changes occur consciously and aim to achieve a better condition than before (Harefa et al., 2023). Therefore, the success of learning is largely determined by the role of educators in managing the learning process to improve students' knowledge, skills, and attitudes. In the context of formal education, educators or teachers have the responsibility to guide and direct students to develop optimally, both physically and spiritually (Buan, 2020).

Learning is a system deliberately designed to create learning conditions that enable changes in student behavior. Gagné and Briggs state that learning is a series of events systematically designed to influence and support students' internal learning processes (Lusiana et al., 2022). Therefore, selecting an appropriate learning model is one of the important factors in improving the quality of the learning process and outcomes.

One learning model considered effective in increasing student activeness and understanding is the Discovery Learning model. This model provides opportunities for students to discover concepts or information through direct learning experiences, resulting in more meaningful and long-lasting understanding (Strauning, 2023). In its implementation, Discovery Learning places students as the main subjects of learning, while teachers act as facilitators who guide the concept discovery process.

The implementation of the Discovery Learning model will be more optimal when combined with the use of the environment as a learning resource. The school environment has great potential to be used as a contextual learning medium, especially in the IPAS subject. This approach aligns with the concept of *social studies as reflective inquiry*, which emphasizes the development of critical, reflective, and problem-solving thinking skills through the study of real phenomena in the surrounding environment (Ginanjar, 2016). Utilizing the environment allows students to connect learning materials with daily experiences, making learning more meaningful.

Learning outcomes are an important indicator in assessing the success of the learning process. Learning outcomes reflect changes in student behavior that can be measured through aspects of knowledge, skills, and attitudes (Masrifah et al., 2023). However, achieving optimal learning outcomes requires learning models that encourage students to think critically, be active, and be directly involved in the learning process.

Based on initial observations conducted on October 7, 2024, in Class V of MIN 31 North Aceh, it was found that student learning outcomes in the IPAS subject had not met the established Minimum Learning Achievement Criteria (KKTP) of 75. The data showed that only 15 students (44.11%) achieved mastery, while 19 students (55.88%) had not yet achieved mastery. Learning was still dominated by conventional methods, such as lectures and assignments, with textbooks as the main learning resource. As a result, student active involvement was low, and understanding of the material was not optimal.

Based on these problems, improvement efforts are needed through the implementation of a more active, contextual, and meaningful learning model. The environment-based Discovery Learning model is considered an appropriate alternative to improve student activities and learning outcomes in the IPAS subject. Through this model, students are expected to discover learning concepts independently through direct observation of the surrounding environment, thereby significantly improving understanding and learning outcomes.

Etymologically, the term *discovery* comes from English meaning "finding," while *learning* means "instruction." Thus, Discovery Learning can be interpreted as learning that emphasizes the discovery process. Although experts provide various definitions, they essentially convey similar meanings. Bruner states that Discovery Learning is a learning process through discovery that aligns with how humans actively acquire knowledge and is believed to produce more optimal understanding (Alfitry, 2020: 25).

Discovery Learning is a form of learning that requires active student involvement by utilizing mental processes to discover certain concepts or principles (Sartono, 2022: 4). This opinion aligns with Illahi, who explains that Discovery Learning is a learning model that allows students to be directly involved in learning activities, enabling them to use their thinking abilities to discover concepts or theories being studied (Achmad, 2022: 18). These mental processes include observing, classifying, making assumptions, explaining, measuring, and drawing conclusions.

Efendi explains that the Discovery Learning model involves students in problem-solving processes to develop knowledge and skills (Yuliana, 2018: 22). This model is student-centered, giving learners opportunities to actively seek information, investigate problems, and discover new concepts independently. The knowledge obtained is then connected with prior knowledge, helping students understand the material more deeply.

Based on these opinions, it can be concluded that the Discovery Learning model emphasizes active student involvement in discovering concepts, principles, or new

knowledge independently. Students are encouraged to explore, observe, ask questions, and understand material through direct experiences, while teachers act as facilitators or guides.

Bruner states that the Discovery Learning process consists of six stages: (1) Stimulation, (2) Problem Statement, (3) Data Collection, (4) Data Processing, (5) Verification, and (6) Generalization (Budiningsih, 2005: 43). Similarly, Mubarok outlines six stages: stimulus, problem identification, data collection, data processing, verification, and conclusion drawing (Mubarok, 2014: 217).

In this study, the Discovery Learning syntax includes these six stages. At the stimulation stage, the teacher provides visual displays and questions to arouse curiosity. Students are then grouped and provided with worksheets (LKPD) as discussion guides. During problem identification, students observe the surrounding environment and formulate questions. Data collection involves direct observation of school environmental objects, followed by systematic data processing with teacher guidance. Verification is conducted by comparing findings between groups, and the final stage involves drawing conclusions and presenting findings.

Discovery Learning has strengths and limitations. Roestiyah states that its advantages include developing cognitive skills, increasing motivation, fostering self-confidence, and promoting student-centered learning (Strauning, 2023: 19–20). However, limitations include inefficiency in large classes and difficulties in implementation for teachers and students accustomed to conventional methods.

Hosnan adds that Discovery Learning encourages active thinking, independent problem-solving, logical reasoning, and better retention of learned material (Hosnan, 2014: 283–289). Nevertheless, it requires sufficient time, student readiness, rational thinking abilities, and may not be optimal for all learners.

Sunhaji explains that learning resources include all resources that can be utilized to support learning processes, either directly or indirectly (Sunhaji, 2011: 77–78). Learning resources encompass information, individuals, and objects that support the achievement of learning objectives.

Humans develop their potential through experiences gained from interaction with both physical and social environments. Therefore, the environment can be used as a learning resource. Sudjana and Rivai state that using the environment as a learning resource increases motivation, meaningfulness, active learning, resource variety, and environmental awareness (Sudjana & Rivai, 2015: 208–209).

The environment includes physical conditions such as natural resources and human-made elements, as well as social interactions (Sembel, 2010; Saifullah, 2014). Continuous interaction with the environment significantly influences students' interests, understanding, and learning outcomes.

The rapid development of science and technology in the twenty-first century has fundamentally reshaped the competencies required of learners in primary education. Science education at the elementary level is expected not only to transmit factual knowledge but also to cultivate critical thinking, problem-solving abilities, and scientific literacy that enable students to understand and respond to real-world phenomena. Scholars have consistently emphasized that early exposure to meaningful science learning experiences plays a crucial role in shaping students' long-term attitudes toward science and their academic trajectories (Bybee, 2013; Harlen, 2010). In this regard, improving science learning outcomes at the primary level remains a pressing concern in many educational contexts.

In Indonesia, the integration of science within the subject Ilmu Pengetahuan Alam dan Sosial (IPAS) reflects an effort to connect scientific concepts with social and environmental realities. The curriculum encourages contextual and student-centered learning approaches that position learners as active participants in constructing knowledge. However, empirical observations in various elementary classrooms indicate that science instruction is often still dominated by teacher explanations and textbook-oriented activities, which limit students' opportunities to explore and investigate phenomena directly (Sanjaya, 2016). Such

practices can hinder the development of conceptual understanding and reduce student engagement.

Learning outcomes in science are closely associated with the quality of instructional processes. According to Slavin (2018), effective learning occurs when students are actively involved in meaningful tasks that require them to think, question, and reflect. Similarly, Hattie (2009) identified active learning strategies and formative feedback as among the most influential factors affecting student achievement. These findings underscore the need for pedagogical models that foster interaction, inquiry, and authentic learning experiences in primary science classrooms.

One instructional model that aligns with these principles is Discovery Learning. Rooted in constructivist theory, Discovery Learning emphasizes students' active engagement in exploring problems, formulating hypotheses, collecting data, and drawing conclusions. The theoretical foundation of this model can be traced to the work of Jerome Bruner (1961), who argued that learning is most effective when learners discover concepts by themselves through structured guidance. Bruner contended that discovery processes enhance retention, transfer of knowledge, and intrinsic motivation.

Constructivist perspectives further reinforce the importance of learner-centered approaches in science education. Jean Piaget (1970) emphasized that children construct knowledge through active interaction with their environment, while Lev Vygotsky (1978) highlighted the role of social interaction and scaffolding in cognitive development. Discovery Learning operationalizes these theoretical insights by encouraging students to engage in hands-on investigation and collaborative discussion, thereby promoting deeper conceptual understanding.

In the context of science learning, discovery-based approaches have been shown to improve students' conceptual mastery and scientific process skills. Research indicates that when students are given opportunities to observe, experiment, and analyze data independently, they develop stronger reasoning abilities and more durable knowledge structures (Prince, 2004; Mayer, 2004). Although debates persist regarding the degree of guidance required in discovery-oriented instruction, there is broad consensus that guided discovery can be particularly effective in elementary settings.

An important dimension that enhances the effectiveness of Discovery Learning is the integration of the surrounding environment as a learning resource. The environment provides authentic contexts that make abstract scientific concepts more concrete and relatable. Environmental-based learning encourages students to observe natural and social phenomena directly, thereby bridging the gap between theory and practice. According to Palmer (1998), direct interaction with the environment fosters curiosity, environmental awareness, and meaningful learning experiences.

Environment-based learning also aligns with experiential learning theory proposed by David Kolb (1984), which posits that knowledge is created through the transformation of experience. By engaging with real-life contexts, students cycle through concrete experience, reflective observation, abstract conceptualization, and active experimentation. In primary science classrooms, such cycles can be facilitated through field observations, simple experiments, and contextual problem-solving tasks.

Furthermore, contextual and environmental approaches have been associated with increased student motivation and engagement. Deci and Ryan (2000) argued in their self-determination theory that intrinsic motivation flourishes when learners experience autonomy, competence, and relatedness. Environment-based Discovery Learning provides opportunities for students to make observations, generate questions, and test ideas, thereby satisfying these psychological needs and enhancing engagement.

Despite the theoretical and empirical support for Discovery Learning and environment-based instruction, their implementation in elementary schools is not without challenges. Teachers may encounter difficulties in classroom management, time allocation, and the design of appropriate learning tasks. As noted by Kirschner, Sweller, and Clark (2006), minimally guided instruction can overwhelm novice learners if not carefully

structured. Therefore, structured planning and iterative reflection are essential components of effective implementation.

Classroom Action Research offers a systematic framework for improving instructional practices through cycles of planning, action, observation, and reflection. Kemmis and McTaggart (1988) conceptualized action research as a collaborative and reflective process aimed at enhancing educational practice. Through cyclical refinement, teachers can identify weaknesses in instruction and implement targeted improvements to optimize learning outcomes.

Previous studies have reported positive effects of Discovery Learning on science achievement at various educational levels. Empirical findings indicate improvements in student engagement, conceptual understanding, and critical thinking skills when discovery-oriented models are applied (Hmelo-Silver, Duncan, & Chinn, 2007). However, the extent to which environment-based Discovery Learning specifically influences teacher activities, student activities, and learning outcomes in integrated IPAS subjects at the elementary level remains underexplored.

In many elementary classrooms, science learning outcomes remain below expected standards, as indicated by low mastery levels and limited student participation during instruction. Observations at MIN 31 Aceh Utara revealed that students often relied heavily on teacher explanations and showed minimal initiative in exploring scientific phenomena independently. Such conditions suggest a mismatch between curriculum expectations and classroom practices.

Teacher activity plays a pivotal role in shaping classroom dynamics and student learning experiences. Effective teachers are not merely transmitters of knowledge but facilitators who design engaging learning environments and guide inquiry processes (Darling-Hammond, 2017). In the context of Discovery Learning, teachers must carefully scaffold activities, pose stimulating questions, and provide feedback that supports conceptual development.

Student activity is equally critical in determining learning success. Active participation in questioning, observing, experimenting, and discussing enables students to construct understanding more effectively than passive listening (Chi, 2009). Increased student activity is often correlated with improved learning outcomes, particularly in science subjects that require hands-on exploration.

Integrating the environment into Discovery Learning may enhance both teacher and student activities. When teachers utilize the schoolyard, local community, or natural surroundings as learning resources, they create authentic contexts that stimulate inquiry. Such integration aligns with the principles of meaningful learning articulated by David Ausubel (1968), who emphasized the importance of connecting new information with learners' existing cognitive structures.

Moreover, environment-based approaches contribute to the development of environmental literacy and responsible citizenship, which are central goals of contemporary education. By engaging directly with environmental issues, students develop awareness and problem-solving skills relevant to sustainable development (Tilbury, 1995). This broader educational value strengthens the rationale for adopting environment-based Discovery Learning in primary science classrooms.

The present study is situated within these theoretical and empirical frameworks. It seeks to address the gap between the potential of Discovery Learning and its practical implementation in elementary IPAS instruction. Through a structured Classroom Action Research design, the study systematically applies and refines an environment-based Discovery Learning model to improve instructional quality and student achievement.

Specifically, this research aims to describe teacher activities during the implementation of the model, to analyze changes in student activities across action cycles, and to examine improvements in student learning outcomes. By focusing on these three interrelated aspects, the study provides a comprehensive evaluation of instructional effectiveness.

The significance of this research lies in its contribution to evidence-based practice in primary science education. By documenting the process and outcomes of implementing environment-based Discovery Learning in a real classroom context, the study offers practical insights for teachers, school leaders, and policymakers seeking to enhance science learning quality.

The theoretical foundations of constructivism, experiential learning, and self-determination theory, combined with empirical findings on Discovery Learning and environmental education, provide a strong rationale for this study. Addressing persistent challenges in science learning outcomes at the elementary level requires innovative and contextually relevant pedagogical approaches. The environment-based Discovery Learning model represents a promising strategy to create active, meaningful, and effective science learning experiences for fifth-grade students at MIN 31 Aceh Utara.

METHODS

This study employed a Classroom Action Research design to improve science learning outcomes through the implementation of an environment-based Discovery Learning model in the IPAS subject at the elementary school level. Classroom Action Research was selected because it provides a systematic and reflective framework for improving instructional practices in authentic classroom settings. In line with the conceptualization of action research by Kemmis and McTaggart (1988), the research was conducted in iterative cycles consisting of planning, action, observation, and reflection. This cyclical design enabled continuous refinement of instructional strategies based on empirical evidence gathered during implementation.

The research was conducted at MIN 31 Aceh Utara during the 2025/2026 academic year. The study involved 34 fifth-grade students enrolled in one intact classroom. The participants comprised 18 male and 16 female students aged between 10 and 11 years. The class was selected based on preliminary observations indicating that students' science learning outcomes in the IPAS subject had not yet reached the expected mastery level. In addition, classroom learning was predominantly teacher-centered, and students' active engagement in inquiry-based activities was limited.

The researcher collaborated with the classroom teacher, who acted as the practitioner implementing the instructional model, while the researcher assumed the role of planner, observer, and reflective partner. This collaborative approach is consistent with the participatory nature of Classroom Action Research, which emphasizes joint problem-solving and professional development (Cochran-Smith & Lytle, 2009).

The study was conducted in two cycles. Each cycle consisted of two meetings, with each meeting lasting 2 × 35 minutes in accordance with the school schedule. The structure of each cycle followed four interconnected stages: planning, action, observation, and reflection.

During the planning stage, the researcher and the classroom teacher collaboratively developed a detailed lesson plan based on the syntax of Discovery Learning, including stimulation, problem identification, data collection, data processing, verification, and generalization, as originally articulated by Jerome Bruner (1961). The lesson plans were adapted to integrate environmental contexts around the school, such as observing plant diversity, soil characteristics, and water usage patterns within the schoolyard. Learning materials, worksheets, observation instruments, and evaluation tools were carefully prepared to ensure alignment with learning objectives and assessment indicators.

The action stage involved implementing the environment-based Discovery Learning model in the classroom. At the stimulation phase, students were introduced to contextual problems derived from real environmental phenomena observed in the school surroundings. In the problem identification phase, students formulated investigative questions collaboratively. During data collection, students conducted direct observations, simple experiments, and recorded findings in structured worksheets. In the data processing

and verification stages, students analyzed their findings through group discussions and compared them with relevant scientific concepts under teacher guidance. Finally, in the generalization phase, students formulated conclusions based on evidence gathered during exploration.

Observation was conducted simultaneously with the implementation of instructional activities. Two observers, namely the researcher and a colleague trained in educational observation, independently recorded teacher and student activities using structured observation sheets. The use of multiple observers aimed to enhance objectivity and minimize bias in data recording.

The reflection stage involved analyzing quantitative and qualitative data obtained during the cycle to identify strengths, weaknesses, and areas requiring improvement. Findings from Cycle I were used to revise instructional strategies, classroom management techniques, and scaffolding approaches implemented in Cycle II. This iterative refinement reflects the reflective dimension of action research emphasized by Stringer (2014).

The instructional intervention consisted of the systematic application of an environment-based Discovery Learning model. The environmental component was operationalized by utilizing natural and social elements within the school context as primary learning resources. Students were encouraged to observe real objects, measure environmental variables using simple tools, and relate empirical findings to theoretical concepts discussed in class.

Guided discovery principles were applied to ensure that students received adequate scaffolding. The teacher provided structured guiding questions, prompts, and feedback to facilitate conceptual clarification. This approach aligns with research suggesting that guided discovery is more effective than minimally guided instruction for novice learners (Hmelo-Silver, Duncan, & Chinn, 2007; Mayer, 2004). The balance between autonomy and guidance was carefully maintained to support cognitive development without causing cognitive overload.

Data were collected using observation and achievement tests. Observation techniques were employed to measure teacher activities and student activities during the learning process. The observation instrument for teacher activities consisted of indicators covering lesson preparation, implementation of Discovery Learning syntax, classroom management, facilitation of student inquiry, and provision of feedback. Each indicator was rated using a four-point Likert scale ranging from very poor to very good.

The student activity observation sheet measured indicators such as participation in discussions, involvement in observation and experimentation, ability to formulate questions, collaboration within groups, and presentation of findings. The instrument was designed to capture both behavioral engagement and cognitive engagement aspects, in accordance with active learning principles described by Chi (2009).

Student learning outcomes were measured through written evaluation tests administered at the end of each cycle. The test consisted of 20 items combining multiple-choice and short-answer questions aligned with the learning objectives and indicators of competency achievement. The test items were constructed to assess conceptual understanding, application of knowledge, and analytical skills related to the environmental themes studied.

To ensure content validity, all instruments were reviewed by two experts in elementary science education and one expert in educational evaluation. The validation process involved assessing the relevance, clarity, and alignment of each item with the research objectives and curriculum standards. Revisions were made based on expert feedback to improve precision and comprehensibility.

A pilot test of the learning outcome instrument was conducted in a comparable fifth-grade class outside the research sample. Item analysis included difficulty index, discrimination index, and reliability testing using the Cronbach's Alpha coefficient. The reliability coefficient obtained was 0.87, indicating high internal consistency according to established psychometric criteria (Creswell, 2014).

Inter-observer reliability for observation instruments was calculated using percentage agreement. The agreement level between observers reached 92%, indicating strong consistency in recording teacher and student activities.

Quantitative data from observation sheets were analyzed by calculating the percentage of observed indicators achieved during each meeting and each cycle. The percentage was obtained by dividing the total score achieved by the maximum possible score and multiplying by one hundred. The results were then categorized into four levels: very good, good, sufficient, and poor, based on predetermined interval criteria.

Student learning outcomes were analyzed by calculating the percentage of students achieving the minimum mastery criterion established by the school. Classical completeness was considered achieved when at least 85% of students reached the minimum mastery threshold. Comparative analysis between Cycle I and Cycle II was conducted to identify trends in improvement.

Qualitative data derived from reflective notes and observer comments were analyzed descriptively to complement quantitative findings. These data provided contextual explanations for changes in teacher performance, student engagement, and learning outcomes across cycles.

Prior to conducting the study, formal permission was obtained from the school principal of MIN 31 Aceh Utara. Students and parents were informed about the purpose and procedures of the research. Participation was conducted within regular instructional activities without disrupting the curriculum. Confidentiality of student data was maintained by anonymizing individual identities in all research reports.

Through this rigorous methodological framework, the study ensured procedural transparency, reliability of findings, and alignment with established standards of educational research. The detailed design and systematic implementation strengthen the scientific credibility of the investigation into the effectiveness of the environment-based Discovery Learning model in improving science learning outcomes.

RESULTS

The results of this Classroom Action Research are presented in three major components, namely teacher activities, student activities, and student learning outcomes. The data were obtained through structured observations and achievement tests conducted in Cycle I and Cycle II. The analysis focuses on the comparison between cycles to determine the extent of improvement after the refinement of the instructional strategy.

Teacher activities were observed using a structured observation sheet consisting of indicators aligned with the syntax of the environment-based Discovery Learning model. The aspects assessed included lesson introduction, stimulation of inquiry, facilitation of problem identification, guidance during data collection and processing, classroom management, feedback provision, and lesson closure. The quantitative results of teacher activity observations are presented in Table 1.

Table 1. Percentage of Teacher Activities in Cycle I and Cycle II

Cycle	Percentage (%)	Category
Cycle I	76.56%	Good
Cycle II	91.40%	Very Good

As shown in Table 1, teacher activity in Cycle I reached 76.56%, which falls into the good category. However, several weaknesses were identified during the reflection stage. The teacher's guidance during data processing was not yet optimal, and time management during environmental observation activities required improvement. In addition, questioning techniques tended to be convergent rather than divergent, limiting students' opportunities to elaborate their reasoning.

After revising the lesson plan and improving scaffolding strategies in Cycle II, teacher activity increased significantly to 91.40%, categorized as very good. Improvements were particularly evident in the stimulation and problem-identification phases, where the teacher provided clearer contextual triggers derived from the school environment. The teacher also facilitated more structured group discussions and provided formative feedback more consistently, resulting in more effective classroom interaction.

Student activities were assessed through direct observation during the implementation of the learning process. The indicators included active participation in discussions, involvement in environmental observation, collaboration within groups, formulation of questions, presentation of findings, and responsiveness to feedback. The comparative data on student activities are presented in Table 2.

Table 2. Percentage of Student Activities in Cycle I and Cycle II

Cycle	Percentage (%)	Category
Cycle I	75.78%	Good
Cycle II	90.62%	Very Good

In Cycle I, student activity reached 75.78%, categorized as good. Although students showed enthusiasm during environmental observations, some groups experienced difficulty in systematically recording data and formulating conclusions. Participation was still dominated by a few active students, while others remained relatively passive during discussions.

Following reflection and instructional refinement, student activity in Cycle II increased to 90.62%, categorized as very good. Students demonstrated greater confidence in posing questions, conducting observations independently, and presenting findings. Group collaboration improved significantly, and nearly all students were actively involved in inquiry processes. The environment-based approach appeared to stimulate curiosity and foster a more participatory learning atmosphere.

Student learning outcomes were measured using written evaluation tests administered at the end of each cycle. Mastery learning was determined based on the minimum mastery criterion established by the school, and classical completeness was achieved when at least 85% of students reached this threshold. The data on student learning outcomes are presented in Table 3.

Table 3. Percentage of Students Achieving Mastery Learning

Cycle	Percentage of Mastery (%)	Category
Cycle I	58.82%	Not Complete
Cycle II	91.17%	Complete

In Cycle I, only 58.82% of students achieved mastery learning, indicating that classical completeness had not yet been attained. Analysis of student answer sheets revealed that many students struggled to apply concepts derived from environmental observations to abstract test questions.

After improvements were implemented in Cycle II, mastery learning increased dramatically to 91.17%, surpassing the classical completeness criterion. Students demonstrated improved conceptual understanding and were able to connect empirical findings from environmental exploration with theoretical explanations. This substantial increase indicates the effectiveness of the environment-based Discovery Learning model in enhancing student achievement.

The results demonstrate consistent improvement across all observed variables from Cycle I to Cycle II. The iterative refinement of instructional strategies contributed to better

teacher performance, increased student engagement, and higher levels of learning achievement.

DISCUSSION

The findings of this study indicate that the implementation of an environment-based Discovery Learning model significantly improved teacher activities, student activities, and student learning outcomes. The increase in teacher activity from 76.56% to 91.40% demonstrates that reflective practice and cyclical refinement can enhance instructional quality. This result aligns with the conceptual framework of Classroom Action Research proposed by Kemmis and McTaggart (1988), which emphasizes continuous improvement through systematic reflection.

The improvement in teacher performance also reflects a shift from a teacher-centered approach to a facilitator-oriented role. As emphasized by Darling-Hammond (2017), effective teachers design learning environments that actively engage students in inquiry and critical thinking. In Cycle II, the teacher's enhanced questioning strategies and structured scaffolding contributed to deeper student exploration and conceptual clarification.

The significant increase in student activity from 75.78% to 90.62% confirms that environment-based Discovery Learning fosters active engagement. This finding supports the constructivist view of Jean Piaget (1970), who argued that learners construct knowledge through active interaction with their environment. Direct observation of natural phenomena in the school surroundings enabled students to link abstract concepts with tangible experiences.

Furthermore, the findings corroborate the theoretical propositions of Jerome Bruner (1961), who maintained that discovery-based learning enhances intrinsic motivation and retention of knowledge. When students were allowed to investigate real environmental issues, their curiosity increased, and they demonstrated greater autonomy in learning. This condition also resonates with the self-determination theory of Deci and Ryan (2000), which highlights the importance of autonomy and competence in fostering intrinsic motivation.

The most substantial impact was observed in student learning outcomes, which increased from 58.82% to 91.17%. This dramatic improvement indicates that the model not only enhanced engagement but also strengthened conceptual understanding. According to Hattie (2009), instructional approaches that promote active learning and formative feedback have a high effect size on student achievement. The structured discovery process in this study provided opportunities for students to test hypotheses, analyze data, and verify conclusions, leading to more meaningful learning experiences.

The integration of environmental contexts also contributed to deeper understanding, consistent with the experiential learning theory proposed by David Kolb (1984). Through cycles of experience, reflection, conceptualization, and experimentation, students internalized scientific concepts more effectively than through passive instruction.

Moreover, the findings support previous research by Hmelo-Silver, Duncan, and Chinn (2007), who emphasized that guided discovery enhances conceptual learning when appropriate scaffolding is provided. The improvements observed in Cycle II suggest that balancing autonomy with structured guidance is essential in elementary science instruction.

In a broader educational context, the results demonstrate that utilizing the school environment as a learning resource enriches instructional quality and fosters meaningful engagement. This approach aligns with environmental education perspectives articulated by Palmer (1998), which stress the importance of direct environmental interaction in developing understanding and awareness.

Although the study achieved classical completeness in Cycle II, it is important to acknowledge that sustained implementation and teacher professional development are necessary to maintain instructional quality. The success of the intervention depended heavily on careful planning, structured scaffolding, and reflective evaluation.

The results confirm that the environment-based Discovery Learning model effectively enhances teacher performance, student engagement, and learning achievement in elementary science education. The integration of real environmental contexts, combined with guided inquiry processes, creates an active, enjoyable, and meaningful learning atmosphere that supports improved educational outcomes.

CONCLUSION

Based on the findings of this Classroom Action Research, it can be concluded that the implementation of an environment-based Discovery Learning model effectively improves teacher activities, student activities, and student learning outcomes in the IPAS subject at MIN 31 Aceh Utara. The iterative process of planning, action, observation, and reflection enabled systematic refinement of instructional practices, resulting in a significant increase in teacher performance from the good to the very good category, accompanied by a parallel rise in student engagement and classical learning mastery from 58.82% to 91.17%. The integration of environmental contexts into guided discovery processes facilitated meaningful learning experiences, strengthened conceptual understanding, and fostered active participation, consistent with constructivist and experiential learning principles as articulated by Jerome Bruner and David Kolb. Therefore, the environment-based Discovery Learning model can be regarded as an effective pedagogical strategy for enhancing the quality of elementary science instruction and may serve as a practical reference for teachers seeking to create active, contextual, and academically rigorous learning environments.

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