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Experiential Learning in Lower-Grade Mathematics Instruction: A Qualitative Study at SDN Cikuntul I

Tarpan Suparman[1], Anggy Giri Prawiyogi[2], Imas Indah Mutiara[3]
[1,2,3]Universitas Buana Perjuangan Karawang, Jawa Barat, Indonesia

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ABSTRACT

Experiential learning provides an approach to connecting students' everyday experiences with mathematical concepts. However, its implementation across the four learning stages in lower-grade mathematics classrooms requires further contextual examination. This study aimed to describe the implementation of Experiential Learning in mathematics instruction at SDN Cikuntul I, Karawang Regency. A qualitative descriptive design was employed. Data were collected through classroom observations, interviews, and documentation and analyzed descriptively using Kolb's four-stage Experiential Learning cycle. The findings describe the implementation of Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. Students participated in concrete learning activities, reflected on their experiences, connected observations with mathematical concepts, and applied their understanding to subsequent tasks. The teacher facilitated the process by providing learning materials, guiding reflection, explaining concepts, and supporting their application. These findings provide a contextual description of how Experiential Learning connects everyday experiences with formal mathematics and offer practical insights for elementary school teachers. However, the study does not establish instructional effectiveness or measure learning gains.

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Corresponding Author:

Tarpan Suparman
Elementary School Teacher Education, Faculty of Teacher Training and Education, Universitas Buana Perjuangan Karawang, Karawang, Indonesia
Email: tarpan.suparman@ubpkarawang.ac.id

1. INTRODUCTION

In elementary education, particularly in mathematics learning, the learning method plays an important role in determining how effectively students understand and apply mathematical concepts. Mathematics involves not only numbers, formulas, and calculations but also logical thinking, problem-solving, reasoning, and the ability to connect concepts with everyday situations. For lower-grade elementary school students, understanding mathematics can be challenging because abstract concepts need to be

introduced through learning experiences that are concrete, familiar, and appropriate to their developmental characteristics [1], [2]. Therefore, an appropriate learning approach is needed to make mathematics learning meaningful, contextual, and relevant to students' daily experiences.

One learning approach that addresses this need is Experiential Learning, which emphasizes learning through direct experience, reflection, conceptualization, and application. Kolb's experiential learning theory describes learning as a process through which knowledge is created through the transformation of experience, involving four interconnected modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation [3]. This framework is particularly relevant to elementary mathematics because it provides a structured process through which students can move from experiencing mathematical situations to reflecting on them, developing conceptual understanding, and applying mathematical knowledge in different contexts. Through these stages, students are not merely recipients of information from teachers but active participants who construct and develop their understanding through learning experiences.

In mathematics instruction, this approach can be implemented through activities involving familiar materials and situations, such as using pencils, toys, fruits, and other classroom objects to explore addition and subtraction, or measuring classroom objects and students' heights to understand measurement concepts. Concrete experiences can help children connect familiar objects and informal knowledge with formal mathematical representations when the activities are deliberately designed to support the intended mathematical concepts [1]. However, the use of concrete materials alone does not automatically produce mathematical understanding. Their educational value depends on how teachers guide students to identify mathematical relationships, interpret their observations, and gradually translate concrete experiences into mathematical representations and abstract concepts. Thus, mathematics learning can progress from concrete experiences toward more formal mathematical understanding.

The need for experience-based mathematics instruction is also associated with students' active participation and opportunities to interact with their learning environment. Lower-grade students generally benefit from activities that involve observation, object manipulation, interaction, movement, and communication. Research on active learning that combines physical activity with mathematics in elementary schools found that such approaches can support mathematics learning while also increasing students' physical activity, although academic effects vary across studies and learning conditions [4]. These findings reinforce the importance of designing learning activities that actively engage students rather than relying exclusively on abstract explanations and written exercises. Experiential learning provides a framework for organizing such activities by encouraging students to observe mathematical phenomena, discuss their findings, reflect on their experiences, and develop conceptual understanding.

Despite the relevance of concrete and contextual learning experiences, implementing mathematics instruction in elementary classrooms remains challenging, particularly when students are expected to understand abstract concepts without sufficient

opportunities to explore their practical meaning. Such conditions may limit students' opportunities to connect mathematical representations with their existing knowledge and everyday experiences. A meta-analysis of elementary mathematics programs indicates that different instructional approaches produce different outcomes, emphasizing the importance of selecting and implementing pedagogical approaches that correspond to students' learning needs and the mathematical content being taught [5]. Accordingly, the central issue is not simply whether teachers provide concrete learning materials, but how they organize and facilitate learning experiences so that students can transform those experiences into meaningful mathematical knowledge.

In this context, teachers have an important role in designing and implementing meaningful mathematics learning activities. Teachers are not only responsible for explaining mathematical concepts but also for creating learning situations in which students can discover and construct knowledge through experience. Experiential learning therefore requires teachers to facilitate each stage of the learning cycle, beginning with relevant experiences, followed by reflection, the development of mathematical concepts, and opportunities to apply those concepts in new situations. Kolb and Kolb (2005) emphasize that experiential learning involves an ongoing cycle in which experience, reflection, conceptualization, and experimentation interact with one another [17]. Consequently, the effectiveness of this approach depends on how the learning cycle is translated into appropriate classroom activities.

Previous empirical research has examined the use of Experiential Learning in elementary mathematics, particularly in relation to students' mathematical understanding and problem-solving abilities. A study published in El-Ibtidaiy: Journal of Primary Education reported the application of Experiential Learning to improve mathematical conceptual understanding among Grade IV elementary school students. Other research has examined the relationship between Experiential Learning and mathematical problem-solving skills among elementary students [6]. In addition, a recent systematic literature review has specifically investigated the effectiveness of Experiential Learning for mathematical problem-solving skills among elementary school students [7]. Taken together, these studies demonstrate the relevance of Experiential Learning in supporting mathematical learning outcomes. However, the existing research emphasis on conceptual understanding and problem-solving does not fully explain how the learning process is organized in classroom practice, particularly how teachers guide lower-grade students from concrete experiences toward mathematical abstraction.

SDN Cikuntul I, located in Tempuran District, Karawang Regency, provides an important context for examining the implementation of Experiential Learning in lower-grade mathematics instruction. In this context, understanding the implementation of the approach requires attention not only to the learning activities provided but also to the instructional processes through which students engage with concrete materials, reflect on their experiences, and develop mathematical concepts. Examining these processes can provide insights into how teachers organize experiential activities, facilitate student participation, and connect mathematics instruction with students' everyday environments.

Although previous studies have addressed the potential of Experiential Learning to support mathematical conceptual understanding and problem-solving, an important aspect that warrants further investigation is the instructional process that connects concrete experience with abstract mathematical understanding in lower-grade classrooms. Specifically, it remains important to understand how teachers select and organize concrete learning experiences, facilitate students' reflection on those experiences, guide the development of mathematical concepts, and provide opportunities for students to apply their understanding. This process-oriented perspective represents an important distinction from studies that primarily emphasize students' learning outcomes. In addition, examining these processes within the specific context of SDN Cikuntul I can provide a contextual account of how the Experiential Learning cycle is translated into actual lower-grade mathematics classroom practices. Therefore, this study contributes by examining the practical implementation of Experiential Learning, particularly the connection between concrete experiences, student participation, and the development of mathematical concepts.

This study focuses on using Experiential Learning methods in lower-grade mathematics instruction at SDN Cikuntul I, Tempuran District, Karawang Regency. Specifically, it examines how teachers plan and implement the method, how students participate in experiential learning activities, and how teachers facilitate the transition from concrete experiences to mathematical conceptual understanding. By examining these aspects, the study is expected to provide a contextual description of the practical implementation of Experiential Learning and the instructional processes involved in connecting students' direct experiences with mathematical concepts. The findings may help teachers and schools develop more meaningful, contextual, and student-centered mathematics learning practices, particularly by offering insights into designing and facilitating experience-based mathematics instruction in lower-grade classrooms.

2. METHOD

2.1. Research Design

This study employs a qualitative descriptive research approach to understand and describe the implementation of the Experiential Learning method in lower-grade mathematics instruction. Rather than measuring learning outcomes through numerical data, this study examines classroom practices, teacher instructional strategies, student participation, and learning experiences during mathematics instruction. A qualitative approach is appropriate because the study seeks to explore phenomena in their natural context and obtain detailed descriptions of participants' experiences and perspectives [8]. In the Indonesian research context, Sugiyono (2023) also explains that qualitative research is appropriate for exploring situations that are complex, contextual, interactive, and rich in meaning. Therefore, this approach enables the researcher to obtain an in-depth description of how Experiential Learning is implemented in mathematics instruction at the elementary school level.

2.2. Research Location and Participants

The research was conducted at SDN Cikuntul I, Tempuran District, Karawang Regency, with participants consisting of lower-grade mathematics teachers and students. Participants were selected purposively based on their direct involvement in the mathematics learning process. Purposive selection is appropriate in qualitative research because participants are selected based on their relevance to the phenomenon being investigated rather than through statistical probability sampling [8]. Lower-grade students were selected because mathematics instruction at this level requires concrete, contextual learning activities appropriate to students' developmental characteristics. The teacher was considered an important participant because implementing Experiential Learning depends heavily on how the teacher designs learning activities, facilitates students' experiences, guides reflection, and connects students' experiences with mathematical concepts. This focus aligns with recent Indonesian research on Experiential Learning in elementary mathematics, which emphasizes concrete experience, reflection, conceptualization, and active experimentation as key components of the learning process [6].

2.3. Data Sources and Collection Techniques

This study used primary and secondary data sources. Primary data were obtained directly through classroom observations and interviews with teachers and students, while secondary data were obtained from relevant instructional documents and supporting classroom records. Data collection was conducted through observation, interviews, and documentation.

Observation was used to examine the actual implementation of Experiential Learning during mathematics instruction, including teacher activities, student participation, learning materials, classroom interactions, and the sequence of learning activities. Particular attention was given to how teachers organized concrete learning experiences, facilitated student reflection, guided the development of mathematical concepts, and provided opportunities for students to apply their understanding. Interviews were conducted with teachers to obtain detailed information concerning the planning, implementation, challenges, and perceived benefits of using Experiential Learning in mathematics instruction. Interviews with students were also conducted to explore their experiences, responses, and perceptions of mathematics learning activities.

Documentation was used to complement the observation and interview data, including lesson plans, teaching materials, student worksheets, photographs of learning activities, and other relevant classroom documents. The research instruments consisted of a classroom observation guide, semi-structured interview guidelines for teachers and students, and a documentation checklist. These instruments were directed toward obtaining information about the implementation of the Experiential Learning cycle, teacher practices, student participation, and mathematics learning experiences. This combination of observation, interviews, and documentation aligns with qualitative studies of mathematics learning that use multiple sources of evidence to develop a contextual understanding of classroom practices [10], [6], [29].

2.4. Analytical Framework: Experiential Learning

The analysis of the learning process was based on Kolb's Experiential Learning cycle, which consists of four interconnected stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation [3]. These four stages served as the analytical framework for examining how Experiential Learning was implemented in lower-grade mathematics instruction.

Concrete experience referred to students' direct involvement in activities or situations related to the mathematical concepts they were learning. Reflective observation involved students' efforts to observe, discuss, and reflect on their experiences. Abstract conceptualization occurred when students connected their experiences with mathematical concepts, principles, or procedures. Active experimentation referred to students' opportunities to apply the concepts they had developed to new problems or situations. Recent Indonesian research on elementary mathematics similarly describes Experiential Learning through the sequence of concrete experience, reflective observation, abstract conceptualization, and active experimentation [6].

To facilitate systematic analysis, classroom observation data were organized according to these four stages. Activities involving students' direct engagement with learning materials and mathematical situations were categorized as concrete experience. Students' observations, discussions, comparisons, and reflections on their activities were categorized as reflective observation. Evidence of students identifying mathematical relationships, explaining procedures, and connecting their experiences with mathematical principles was categorized as abstract conceptualization. Meanwhile, activities involving applying previously developed mathematical concepts to exercises or different situations were categorized as active experimentation. Teacher activities were also examined to understand how instructional guidance supported the progression between the four stages.

2.5. Data Analysis

After data collection, the researcher organized and categorized information obtained from observations, interviews, and documentation according to the stages of the Experiential Learning cycle. The analysis employed a deductive approach, in which Kolb's four experiential learning stages served as predetermined analytical categories. This approach enabled the researcher to examine how each stage was reflected in classroom activities, teacher instructional practices, and student participation. The researcher then analyzed the data through data reduction, data display, and conclusion drawing, following the qualitative data analysis framework developed by Miles, Huberman, and Saldaña (2014).

Data reduction involved selecting, focusing, simplifying, and organizing information relevant to the research objectives. Observation records, interview responses, and documentation were examined to identify information relevant to the implementation of Experiential Learning and categorized according to the analytical framework. Data were displayed by organizing the findings into descriptive categories related to the implementation of Experiential Learning, teacher activities, student participation, and mathematics learning experiences. The information obtained from different data sources

was compared to identify patterns, similarities, and differences in the implementation of the learning cycle. Finally, conclusions were drawn by identifying patterns, relationships, and meanings emerging from the collected data [11]. This analytical procedure also aligns with recent Indonesian research on Experiential Learning in elementary mathematics, which reports using data reduction, data presentation, and conclusion drawing to analyze classroom research data [6].

2.6. Trustworthiness of the Data

To ensure the credibility of the findings, the study applied data triangulation by comparing information from observations, interviews, and documentation. Triangulation was used to examine the consistency of information obtained from different data sources and techniques. In this study, classroom observations were compared with teachers' and students' interview responses and relevant learning documentation. If the information demonstrated consistency across different sources, it strengthened the credibility of the research findings. Conversely, differences among sources were examined further to understand the reasons behind the variation rather than being immediately eliminated from the analysis. Recent Indonesian research examining Experiential Learning in elementary mathematics has also reported using source and technique triangulation [6].

The researcher also maintained the research context and natural setting throughout the data collection and analysis process. Classroom interactions between teachers, students, learning materials, and mathematical activities were examined within their actual instructional context. This mattered because the study aimed not only to determine whether Experiential Learning produced a particular numerical outcome but also to understand how participants implemented and experienced the learning method. A recent qualitative study from Indonesia similarly used classroom observation, teacher interviews, and learning-document analysis to examine the needs and implementation context of Experiential Learning-based mathematics learning [10].

Through this methodological process, the study provides a comprehensive description of how Experiential Learning is implemented in lower-grade mathematics instruction at SDN Cikuntul I, Tempuran District, Karawang Regency. The analysis focuses on the relationship between students' concrete experiences, reflection, development of mathematical concepts, and opportunities to apply those concepts in subsequent activities. The findings are expected to illustrate the practical implementation of an experience-oriented mathematics learning approach and to provide contextual information for teachers and schools seeking to develop more active, meaningful, and student-centered mathematics instruction.

3. RESULTS

3.1. Implementation of Experiential Learning in Lower-Grade Mathematics Instruction

The implementation of Experiential Learning in lower-grade mathematics instruction at SDN Cikuntul I is organized around four interconnected stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active

Experimentation. These stages provide an analytical structure for describing how mathematical learning activities connect, beginning with direct experiences and progressing toward applying mathematical concepts. The four stages are summarized in Table 1.

Table 1. Stages of Experiential Learning in Lower-Grade Mathematics Instruction

No.	Experiential Learning Stage	Representative Classroom Activity
1	Concrete Experience (CE)	Students use real objects such as pencils, bottle caps, sticks, blocks, or other classroom materials to count, group, compare, measure, or perform basic mathematical operations.
2	Reflective Observation (RO)	Students observe the results of their activities, discuss what they have found, compare their answers, and explain how they obtained the results.
3	Abstract Conceptualization (AC)	The teacher guides students to connect their experiences with mathematical concepts, symbols, formulas, operations, or procedures.
4	Active Experimentation (AE)	Students apply the mathematical concepts they have learned to different questions, situations, exercises, or everyday problems.

Table 1 presents the relationship between the four stages as a continuous learning process rather than as separate classroom activities. The learning sequence begins with students' direct engagement with mathematical situations. Students then examine the experience through reflection, connect it to formal mathematical concepts, and apply the concepts in other situations.

3.1.1. Concrete Experience

Concrete experience represents the initial stage in which mathematical concepts are introduced through direct interaction with objects or learning materials. The learning activities described in the study use familiar objects, including pencils, bottle caps, sticks, blocks, and other classroom materials. These materials can serve as concrete representations for mathematical activities such as counting, grouping, comparing quantities, measuring, and understanding basic operations.

Concrete materials provide a context in which students can encounter mathematical ideas through observable activities before working with formal mathematical symbols. For example, combining groups of objects can represent addition, while separating objects can illustrate subtraction. Similarly, arranging objects according to their length can provide a concrete context for comparing measurements.

In this learning stage, the mathematical purpose of using materials needs to remain explicit. The objects are not merely learning aids or sources of physical activity; they function as representations that connect students' experiences with the mathematical concepts being introduced.

3.1.2. Reflective Observation

Reflective observation focuses on students examining the experiences they have undertaken. Following concrete activities, students are expected to observe the results, compare different outcomes, and communicate their understanding of the activities. Reflection allows students to move beyond completing a task and consider the mathematical meaning of the experience.

The reflective process can be supported through questions that direct students' attention to the results and procedures of their activities. Questions about the number of objects before and after an operation, differences between groups, or how an answer was obtained can help students explain their mathematical reasoning.

This stage also highlights the teacher's role in facilitating classroom reflection. Rather than immediately providing the correct answer, the teacher can guide students to examine their work, communicate their observations, and consider alternative answers. Reflection therefore connects direct experience with the development of mathematical understanding.

3.1.3. Abstract Conceptualization

Abstract conceptualization concerns the connection between students' experiences and formal mathematical knowledge. At this stage, concrete activities and the results of reflection are connected with mathematical terminology, symbols, operations, and procedures.

For example, the experience of combining two groups of objects can be represented through addition notation. The combination of three objects and two additional objects can be expressed symbolically as $3 + 2 = 5$. Similarly, activities comparing object lengths can provide a context for introducing measurement concepts and related mathematical terminology.

The transition from concrete representations to mathematical symbols is an important component of this stage. Students need to understand the relationship between the objects they manipulate, the results they observe, and the mathematical representations used to express those results. The teacher's guidance is therefore important in helping students connect practical experiences with formal mathematical concepts.

3.1.4. Active Experimentation

Active experimentation involves applying mathematical concepts developed during the previous stages to different questions or situations. Application activities may include solving new exercises, working with different objects, or using mathematical understanding in situations beyond the initial learning activity.

For example, after working with addition through concrete objects, students can be introduced to different addition problems that require them to use the same mathematical concept in another context. Likewise, understanding measurement can be extended through activities involving objects that were not used during the initial experience.

This stage emphasizes applying mathematical understanding rather than repeating an identical activity. It provides an opportunity to examine whether students can use the

concepts developed through experience and reflection when responding to different mathematical tasks.

3.2. Student Engagement and Teacher Facilitation

Student engagement and teacher facilitation are relevant aspects of the four-stage learning process. The activities described in the study position students as participants who engage with learning materials, examine the results of their activities, connect experiences with mathematical concepts, and apply their understanding to subsequent tasks.

The learning process also places the teacher in a facilitating role. Teacher facilitation is relevant across the four stages: preparing activities and materials during Concrete Experience, guiding students' observations during Reflective Observation, connecting experiences with mathematical representations during Abstract Conceptualization, and providing opportunities for application during Active Experimentation.

The relationship between student engagement and teacher facilitation is reflected in the learning cycle's continuity. Students' participation in concrete activities needs to be followed by opportunities to discuss and interpret their experiences. Teacher guidance is then required to connect these experiences with mathematical concepts and to provide further opportunities for application.

The results section therefore identifies four interconnected stages of Experiential Learning and two related instructional aspects: student engagement and teacher facilitation. These aspects describe the instructional structure through which concrete mathematical experiences are connected with reflection, conceptual understanding, and application.

4. DISCUSSION

4.1. Experiential Learning as a Process of Connecting Concrete Experiences with Mathematical Understanding

The findings indicate that implementing Experiential Learning in lower-grade mathematics instruction at SDN Cikuntul I can be understood as a learning process that connects students' direct experiences with mathematical understanding through four interconnected stages. These stages—Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation—illustrate that experiential learning involves more than students' physical involvement in classroom activities. The central feature of this approach is the process through which students examine their experiences, develop conceptual understanding, and apply what they have learned. This interpretation aligns with Kolb's experiential learning framework, which emphasizes transforming experience into knowledge through an interconnected learning cycle [3], [16].

In lower-grade mathematics, the connection between concrete experiences and formal mathematical concepts is particularly important. Students may encounter difficulties when mathematical symbols and procedures are introduced without sufficient contextual support. Concrete activities can provide an initial representation of mathematical ideas, allowing students to observe and manipulate quantities before working with abstract symbols. This interpretation is supported by Carbonneau et al. (2013), whose

meta-analysis indicates that concrete manipulatives can support mathematics learning when their use is appropriately connected to the concepts being taught [18]. Similarly, research by Maslichah and Susilo (2026) highlights the potential of concrete, visual, and interactive learning media to support elementary students' understanding of multiplication [19].

The findings also emphasize that concrete experience alone is insufficient to establish mathematical understanding. Students need opportunities to examine the results of their activities and connect those results with mathematical concepts. This distinction is important because the use of physical materials does not automatically ensure that students understand the mathematical relationships represented by those materials. The learning process therefore needs to move beyond manipulation toward reflection and conceptual development. This interpretation is consistent with research emphasizing that concrete representations should be explicitly connected to mathematical ideas [1], [21].

4.2. The Importance of Reflection and the Transition from Concrete to Abstract Thinking

Reflective Observation and Abstract Conceptualization are essential in explaining how students move from direct mathematical experiences toward formal understanding. Reflection enables students to reconsider what they have done, compare results, and identify mathematical relationships within their activities. Without this process, classroom activities may remain focused on completing tasks rather than developing an understanding of the concepts underlying those tasks.

The teacher's role is important in facilitating this transition. Through guiding questions and classroom discussion, teachers can encourage students to explain their observations rather than simply provide numerical answers. This approach is consistent with the view that reflection allows learners to examine experiences and construct meaning from them. Halimah and Hidayah (2026) also describe reflective observation as an important stage in elementary mathematics learning through Experiential Learning.

Abstract conceptualization subsequently enables students to connect the results of reflection with mathematical symbols, terminology, and procedures. For example, an activity involving the combination of two groups of objects can be connected with addition notation. The relationship between concrete objects and symbolic representation needs to be made explicit so that students understand what the mathematical symbols represent. Research by Shobiyya et al. (2025) emphasizes the relevance of connecting mathematical concepts with real-life experiences in elementary mathematics and identifies the contribution of experience-oriented learning to mathematical problem-solving [20].

This transition is particularly relevant for lower-grade students because mathematical understanding needs to develop from representations that are accessible to them toward more formal forms of mathematical expression. Accordingly, the effectiveness of experiential learning depends not only on the availability of concrete materials but also on the teacher's ability to guide students in interpreting and representing their experiences mathematically. This interpretation is consistent with research

emphasizing the importance of connecting concrete experiences with mathematical concepts [15].

4.3. Active Experimentation and the Application of Mathematical Concepts

Active experimentation extends the learning process beyond students' initial experiences and conceptual understanding. At this stage, students have opportunities to apply mathematical concepts to different exercises, problems, or situations. Application is important because understanding a concept should not be limited to the specific materials or activities used when the concept was first introduced.

This stage also distinguishes Experiential Learning from instructional activities that merely involve manipulatives, games, or physical participation. An activity becomes part of the experiential learning cycle when students use the understanding developed through experience, reflection, and conceptualization to respond to another situation. This interpretation is consistent with Kolb's framework, which positions experimentation as an interconnected component of the process through which experience is transformed into knowledge [3].

The relevance of this process is also reflected in previous research on experiential learning in elementary mathematics. Tayibu and Kumullah (2021) examined the implementation of Experiential Learning in mathematics instruction at SD Inpres Layang Tua II Makassar in relation to students' mathematics learning outcomes. Nurmayanti et al. (2025) discussed using Experiential Learning to develop elementary students' numeracy skills, while Halimah and Hidayah (2026) examined its application in supporting mathematical problem-solving. These studies provide a broader context for understanding the importance of connecting direct mathematical experiences with subsequent conceptual development and application.

4.4. Teacher Facilitation and Student Engagement

The implementation of Experiential Learning highlights the teacher's role as a facilitator of students' learning experiences. Rather than relying exclusively on explanations, teachers need to organize activities that allow students to encounter mathematical concepts, reflect on their experiences, develop conceptual understanding, and apply what they have learned. Teacher facilitation is therefore necessary throughout the learning cycle, particularly when students move from concrete representations toward abstract mathematical concepts.

This role also involves ensuring that learning materials have a clear mathematical purpose. Concrete objects should not be introduced merely to make classroom activities more attractive. Instead, teachers need to establish explicit connections between the materials, the mathematical tasks, and the concepts students are expected to understand. Research on concrete manipulatives similarly emphasizes the importance of integrating materials into instruction in ways that support mathematical understanding [1], [22].

Student engagement in experiential learning can also be understood through the opportunities provided for participation, communication, and interaction. Activities involving observation, discussion, comparison, and explanation can create opportunities

for students to communicate their mathematical reasoning using language appropriate to their level of understanding. Such opportunities are relevant to collaborative learning and mathematical communication [26].

The relationship between physical activity and mathematics learning has also been examined in previous research. Vetter et al. (2020) reported that active learning approaches combining physical activity and mathematics can support mathematics learning while increasing students' physical activity, although the outcomes depend on the instructional design and learning context [27]. This suggests that active participation should be considered in relation to its instructional purpose, rather than treated as sufficient evidence of mathematical learning.

4.5. Challenges in Implementing Experiential Learning

Although Experiential Learning offers a structured process for connecting experiences with mathematical understanding, its implementation requires careful instructional planning. The use of concrete materials does not automatically guarantee that students will develop the intended mathematical concepts. If the mathematical purpose of an activity is not made explicit, students may focus primarily on manipulating objects without understanding the mathematical relationships represented by them. This concern is consistent with research highlighting the importance of connecting concrete manipulatives with mathematical concepts [1], [18].

Another consideration is the transition from concrete materials to abstract representations. Students may need additional guidance when moving from manipulating objects to understanding mathematical symbols and procedures. Consequently, teachers need to provide appropriate explanations, questions, and follow-up activities to support this transition. The learning process should not stop when students successfully complete a concrete task; it should continue until they have opportunities to explain and apply the underlying concept.

Implementation also requires teachers to prepare suitable activities, select relevant materials, formulate guiding questions, and organize classroom interaction. Classroom management may become more demanding when students work with materials or participate in collaborative activities. Furthermore, the same type of concrete activity may not be appropriate for every mathematical topic or developmental level. These considerations highlight the need to adapt instructional activities to the mathematical content and characteristics of students [28].

Therefore, the implementation of Experiential Learning requires a balance between direct student participation, conceptual guidance, and opportunities for independent application. The four stages should remain connected while allowing teachers to adjust the learning process according to students' responses and the demands of the mathematical content.

4.6. Implications and Limitations

The findings have implications for lower-grade mathematics instruction, particularly in designing learning activities that connect students' experiences with formal

mathematical concepts. Teachers can use familiar objects and contextual activities as initial representations of mathematical ideas, but these activities need to be followed by structured reflection, conceptual explanation, and application. This approach positions Experiential Learning as a learning process rather than simply a strategy for increasing classroom activity.

The findings are also consistent with Indonesian studies examining the relevance of Experiential Learning to elementary students' numeracy, mathematical conceptual understanding, and problem-solving development [13], [6], [7]. Taken together, these studies support the relevance of experience-oriented learning in elementary mathematics, while the present study provides a contextual account of the four-stage learning process at SDN Cikuntul I.

Several limitations should be considered when interpreting the findings presented in this study. First, the current presentation of the results provides limited direct evidence from classroom observations and participant accounts. The inclusion of detailed observation excerpts and quotations from teachers and students would strengthen the connection between the interpretations and the empirical data. Second, the description of student engagement needs to be supported by specific evidence showing how students participated during each stage of the learning process. Third, further investigation is needed to examine whether all four stages are implemented with similar consistency or whether particular stages, especially reflection and abstract conceptualization, require additional instructional support.

Future research could examine in greater detail how teachers facilitate the transition from concrete experiences to abstract mathematical representations, how students respond to each stage, and what classroom conditions influence the continuity of the experiential learning cycle. Such investigations would provide a more detailed understanding of the implementation of Experiential Learning in lower-grade mathematics instruction.

5. CONCLUSION

This study describes the implementation of Experiential Learning in lower-grade mathematics instruction at SDN Cikuntul I through four interconnected stages: Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation. The process connects students' direct experiences with reflection, mathematical concept development, and application. The teacher plays an important role as a facilitator by guiding activities, encouraging reflection, explaining mathematical concepts, and providing opportunities for practice. Student participation is reflected in their involvement with concrete materials and learning activities.

This study contributes a context-specific description of Kolb's Experiential Learning cycle in elementary mathematics and offers practical insights for teachers in connecting everyday experiences with formal mathematical concepts. However, the study is limited to implementation in one school and does not measure learning outcomes or establish instructional effectiveness. Future research should examine learning outcomes through mixed-methods or quasi-experimental designs and compare different grade levels, mathematical topics, and school contexts.

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