International Journal of Social Science and Human Research

ISSN (print): 2644-0679, ISSN (online): 2644-0695

Volume 09 Issue 09 September 2026

DOI: 10.47191/ijsshr/v9-i9-98, Impact factor- 8.361

Page No: 8315-8320

A Process for Organizing New Knowledge Construction Activities in Grade 3 Geometry and Measurement Based on Experiential Learning Theory

Huong Le Thi Thu[1], Ly Nguyen Khanh[2]

[1]Faculty of Primary Education, Thai Nguyen University of Education, Vietnam

[2] Linh Dam Primary School, Ha Noi Capital, Vietnam

ABSTRACT: Grade 3 Geometry and Measurement provides many opportunities for primary students to construct knowledge through observation, manipulation of models, measurement, and the use of tools. However, a hands-on activity does not automatically constitute experiential learning; primary students need to observe, analyze, and generalize the results of the activity into mathematical knowledge. This study proposes a process for organizing new knowledge construction activities in Grade 3 Geometry and Measurement based on Kolb's experiential learning theory and the requirements of Vietnam's 2018 Mathematics Curriculum. Two methods were employed: analysis and synthesis of documents and curriculum content analysis. The findings identify four requirements for developing the process and propose five steps: identifying the expected learning outcomes, the new knowledge, and primary students' prior experience; designing experiential tasks, learning materials, and guiding questions; organizing concrete experience; facilitating observation, reflection, and new knowledge construction; and providing immediate application and assessing knowledge construction. The process is illustrated through an activity in which primary students formulate the rules for calculating the areas of rectangles and squares. The article also clarifies the teacher's role and the conditions required for primary students' experience to be transformed into mathematical knowledge.

KEYWORDS: experiential learning; Geometry and Measurement; knowledge construction; Grade 3 mathematics; primary education.

1. INTRODUCTION

Vietnam's 2018 General Education Curriculum in Mathematics stipulates that mathematics education should provide primary students with opportunities to develop mathematical competencies and apply knowledge and skills to problems in learning and everyday life (Ministry of Education and Training, 2018). This orientation requires a shift from mainly transmitting ready-made conclusions to organizing activities in which primary students draw on experience and gradually construct mathematical understanding. At the primary level, this requirement is particularly relevant to content that can be linked directly to physical objects, models, and learners' actions.

Grade 3 Geometry and Measurement includes such content as recognizing right and non-right angles, identifying the midpoint of a line segment, circles, perimeter, area, units of measurement, and the use of selected mathematical instruments. This content allows primary students to observe, measure, draw, fold, cut, assemble, cover shapes with unit squares, or verify results with instruments. Direct activity provides sensory data and outcomes that can serve as starting points for reasoning. However, if a teacher merely asks primary students to follow instructions and then immediately presents a conclusion, the activity remains practice. Experience becomes a source of learning only when primary students can examine the results, explain them, identify relationships, and apply what they have inferred to a new case.

Kolb's experiential learning theory views learning as the process through which knowledge is created by transforming experience (Kolb, 1984). The cycle consists of concrete experience, reflective observation, abstract conceptualization, and active experimentation. This approach has been applied to the design of learning activities in various fields (Kolb & Kolb, 2005; Morris, 2020). In mathematics education, studies indicate that experiential activities can support connections between knowledge and situations, increase learner participation, and create opportunities to apply knowledge (Tong et al., 2020; Uyen et al., 2022). In Vietnam, studies have addressed the translation of Kolb's cycle into subject-based learning activities (Trần Thị Gái, 2017; Đào Thị Minh Ngọc & Nguyễn Thị Hằng, 2018). Nevertheless, its application to new knowledge construction in Grade 3 requires further clarification, particularly regarding the relationship among concrete manipulation, reflection, and the generalization of mathematical knowledge.

This study therefore addresses the following question: How can experiential learning theory be translated into a process for organizing new knowledge construction activities in Grade 3 Geometry and Measurement? The study aims to identify the requirements for such a process, propose its steps, and illustrate its application to a specific topic. It does not evaluate the empirical effectiveness of the process but focuses on clarifying its theoretical basis and organizational logic.

2. THEORETICAL BACKGROUND AND RESEARCH METHODS

2.1. Experiential Learning and Knowledge Construction

Learning from experience is rooted in Dewey's educational thought, in which experience has educational value only when it leads to growth and connects with subsequent experiences (Dewey, 1938). Building on this foundation, Kolb (1984) describes learning as a cycle through which experience is transformed. Concrete experience provides an initial situation or data. Reflective observation enables learners to examine what occurred from different perspectives. Abstract conceptualization allows them to form an understanding, principle, or explanatory model. Active experimentation returns that new understanding to action for verification and adjustment.

The four phases are continuous, but they should not be interpreted as four rigid operations that must occupy equal amounts of time in every lesson. Kolb and Kolb (2005) emphasize that the learning space should allow learners to move among action, reflection, idea formation, and application. In a systematic review, Morris (2020) also notes that experiential learning requires attention to context, learner agency, and opportunities for learners to act on the conclusions they have formed. The value of the cycle therefore lies not in repeating the names of its four phases, but in creating a reasoned transition from experience to understanding and from understanding to new action.

In mathematical knowledge construction, this transformation occurs when primary students use the results of observation or manipulation to identify properties and relationships. For example, covering a rectangle with unit squares creates a concrete experience. Knowledge of how to calculate area is constructed only when primary students recognize that the number of squares in a row is related to the length, the number of rows is related to the width, and the total number of squares can therefore be generalized as a multiplication. The teacher must consequently design both the manipulative task and a sequence of questions that leads primary students from describing the outcome to explaining and generalizing it.

2.2. Applicability to Grade 3 Geometry and Measurement

The Grade 3 Mathematics Curriculum requires primary students to recognize and describe selected geometric objects, use instruments to measure or verify, perform calculations with quantities, and solve familiar problems (Ministry of Education and Training, 2018). Much of the knowledge in Geometry and Measurement can be approached through activities involving objects, images, models, and instruments. This characteristic corresponds to primary primary students' need to learn through action and visual support, while enabling them to express their observations in words, drawings, measurements, or calculations.

The suitability of the content does not mean that every lesson must be organized as a complex experiential activity. Teachers need to determine which knowledge primary students can discover from the outcomes of an activity and which knowledge requires prompting or formalization. Tasks must generate the information needed for knowledge construction; learning materials must directly serve the intended outcome; and questions must guide purposeful observation. The teacher's role is therefore not reduced, but shifts toward selecting experiences, organizing discussion, addressing misconceptions, and formalizing mathematical language.

2.3. Research Methods

The study employed two methods. First, analysis and synthesis of documents were used to clarify the meaning of experiential learning, the phases of Kolb's cycle, the role of reflection, and key considerations when applying the theory to teaching. The selected documents included foundational works by Dewey and Kolb, studies that analyzed or revised the theory, and research on applications of experiential learning in subject teaching and mathematics education.

Second, curriculum content analysis was used to examine the aims, expected learning outcomes, and characteristics of Grade 3 Geometry and Measurement in Vietnam's 2018 Mathematics Curriculum. The analysis was compared with the phases of experiential learning to determine the requirements of the process, the activities of teachers and primary students, and the illustrative content. On this basis, the study formulated a five-step process and analyzed an example in which primary students construct the rules for calculating the areas of rectangles and squares.

3. RESULTS

3.1. Requirements for Developing the Process

A process for organizing new knowledge construction activities should meet the following four requirements.

First, align with the expected learning outcomes and identify the intended new knowledge. The experience must serve a specific purpose, such as recognizing a property, forming a representation, identifying a relationship, or deriving a rule. The teacher needs to distinguish the core learning outcome from incidental products of the activity so that a mathematics lesson does not become a craft activity or a presentation of materials.

Second, enable primary students to produce and record outcomes directly. The task should require primary students to observe, measure, draw, fold, cut, assemble, cover a shape, or use an appropriate instrument. Each primary student needs data or a trace of the activity to contribute to the subsequent discussion; merely watching the teacher demonstrate is unlikely to produce an equivalent learning experience.

Third, ensure the transformation of experience into mathematical knowledge. After completing the manipulation, primary students need to describe the outcome, compare cases, explain their method, and draw a conclusion. The teacher uses questions to clarify mathematical relationships, address errors, and formalize the conclusion. This requirement is decisive in distinguishing experiential learning from simple practice.

Fourth, ensure suitability for Grade 3 primary students and classroom conditions. Tasks should be manageable, materials safe, procedures clear, and time controllable. Activities can be organized in the classroom with simple materials; they do not have to take place outside the classroom or form part of a large-scale project.

3.2. Process for Organizing New Knowledge Construction Activities

Based on these requirements, the study proposes a five-step process. The first two steps belong to the teacher's preparation, while the final three are implemented through primary students' learning activities. This structure avoids equating the five organizational steps with the four phases of Kolb's cycle.

Table 1. Process for organizing new knowledge construction activities

Step	Content and purpose	Relationship to the experiential learning process
1	Identify the expected learning outcomes, the new knowledge, and primary students' prior experience.	Establish the intended outcome of experience transformation; identify the starting point and the knowledge that primary students can discover independently.
2	Design experiential tasks, learning materials, and guiding questions.	Create conditions in which the experience generates the data needed for observation, reflection, and generalization.
3	Engage primary students in concrete experience.	Represent the concrete experience phase: primary students manipulate materials, observe, and record their results directly.
4	Facilitate observation, reflection, and new knowledge construction.	Combine reflective observation with abstract conceptualization to form concepts, properties, relationships, or rules.
5	Provide immediate application and assess knowledge construction.	Create an opportunity for active experimentation in a similar case or one involving a simple change, and obtain information for refining primary students' understanding.

Step 1. Identify the expected learning outcomes, the new knowledge, and primary students' prior experience. The teacher uses the curriculum and lesson content to determine the concept, property, relationship, rule, or procedure to be constructed. The teacher then analyzes primary students' relevant prior knowledge and experience and anticipates evidence that the new knowledge has been constructed. This identification supports the selection of an appropriate experience and clarifies which elements require prompting or formalization.

Step 2. Design experiential tasks, learning materials, and guiding questions. The task should allow primary students to obtain results directly through observation or manipulation. The teacher selects physical objects, models, images, measuring instruments, or worksheets and develops questions that progress from description to comparison, explanation, and generalization. Possible approaches and errors should be anticipated so that appropriate support can be prepared.

Step 3. Engage primary students in concrete experience. The teacher assigns the task, explains how to use the materials, and chooses individual, pair, or group work as appropriate. Primary students directly measure, draw, fold, cut, assemble, verify, or construct shapes; they record the results in words, measurements, drawings, symbols, or tables. The teacher observes and supports primary students with questions without providing the conclusion in advance.

Step 4. Facilitate observation, reflection, and new knowledge construction. Primary students present their results, describe the procedure, compare cases, and explain differences. From the results of the activity, they identify mathematical properties or relationships and begin to express a conclusion. The teacher synthesizes the responses, addresses inaccurate understandings, and formalizes the conclusion in appropriate language. This is the central step because it transforms the outcomes of manipulation into knowledge.

Step 5. Provide immediate application and assess knowledge construction. The teacher assigns a short task with new data or asks primary students to explain or verify a result. Primary students use the knowledge they have just constructed, compare it with the previous experience, and adjust their understanding if necessary. The results enable the teacher to identify primary students' level of understanding during the activity.

3.3. Illustration Using the Areas of Rectangles and Squares

The example aims to construct two rules: to calculate the area of a rectangle, multiply its length by its width, expressed in the same unit of measurement; to calculate the area of a square, multiply the length of one side by itself. Before the activity, primary students have an initial understanding of area, know the square centimetre, know that a square with a side length of 1 cm has an area of 1 cm^2, and can perform multiplication.

Table 2. Illustration of the process through an activity for constructing area rules

Step	Implementation in the illustrative example
1	Identify the new knowledge as the rules for calculating the areas of rectangles and squares. Prior experience includes an initial understanding of area, unit squares, length measurement, and multiplication.
2	Prepare a 6 cm × 4 cm rectangle, a square with a side length of 5 cm, paper squares with side lengths of 1 cm, a ruler, and a recording sheet. Task: cover each shape completely, determine the number of squares in each row and the number of rows, and find a quick way to calculate the total number of squares.
3	Primary students cover the rectangle with 1 cm^2 squares and record that each row contains 6 squares and that there are 4 rows; the total number of squares is $6 \times 4 = 24$. For the square, each row contains 5 squares and there are 5 rows; the total number of squares is $5 \times 5 = 25$.
4	Groups present and compare their results. The teacher guides primary students to recognize that the number of squares in a row corresponds to the numerical value of the length, while the number of rows corresponds to the numerical value of the width; in a square, both numbers equal the numerical value of one side. Primary students state the rules in words, and the teacher formalizes them.
5	Primary students calculate the area of a 7 cm × 3 cm rectangle and a square with a side length of 4 cm, then verify the results using a square grid or separate unit squares. The teacher assesses their choice of operation, their explanation of its relationship to the number of squares, and their use of measurement units.

In this example, the unit square serves as a bridge between primary students' initial understanding of area and the calculation. If primary students are merely asked to cover the shapes and are then given the rules, the activity does not clarify how experience is transformed. Questions about the number of squares in each row, the number of rows, and the relationship of these numbers to the side lengths help primary students reorganize the outcomes of manipulation into a mathematical relationship. The task in Step 5 allows primary students to verify the rules with new dimensions and helps reveal errors in the choice of operation or the omission of the unit of area.

3.4. Conditions for Implementing the Process

For the process to function as intended, the experiential task must produce outcomes that primary students can observe and use in reasoning. Learning materials should be sufficient for direct participation, but should not be more complex than the knowledge requires. Guiding questions must relate to the outcomes primary students have produced; broad questions such as "What have you learned?" are often insufficient to help Grade 3 primary students generalize. Teachers need to ask specific questions about measurements, positions, quantities, similarities and differences, or the reason for choosing an operation.

The process also requires flexibility. Some knowledge may require several rounds of experience and comparison, whereas other content may require only a brief classroom activity. The steps do not have to be organized as separate parts of a lesson. What must be maintained is the relationship among experience, reflection, generalization, and application. When primary students do not have a sufficient basis for drawing a conclusion independently, the teacher may provide additional cases, ask more focused questions, or directly formalize knowledge that lies beyond their capacity to discover.

4. DISCUSSION

The proposed process translates experiential learning theory into the specific function of constructing new knowledge. Importantly, it does not equate primary students' learning cycle with the teacher's sequence of preparation. Steps 1 and 2 help the teacher identify the intended knowledge and establish the conditions under which the learning cycle can occur; Steps 3, 4, and 5 more clearly represent the processes of experience, reflection, generalization, and experimentation. This distinction avoids mechanically matching each organizational action to one of Kolb's phases.

The findings also indicate that direct activity is only an initial condition. Morris (2020) notes that experiential learning should engage learners in purposeful action and use its outcomes to inform subsequent action. In mathematics teaching, this requirement is reflected in primary students' explanation of results and their construction of mathematical relationships from the data obtained. Covering a shape with unit squares is meaningful when primary students relate the number of squares to the side lengths; placing or arranging the squares alone does not produce the rule for calculating area.

The teacher assumes an active role in the process. Teachers determine the limits of what primary students can discover independently, select learning materials, anticipate errors, and design questions. During reflection, the teacher needs to balance opportunities for primary students to express their understanding with the requirement to ensure the accuracy of the knowledge. This view is consistent with Schunk's (2020) observation that knowledge construction still requires guided support and feedback, particularly for young learners and new knowledge.

Compared with studies that have applied experiential learning to problem solving or the consolidation of mathematical knowledge in higher grades (Tong et al., 2020; Uyen et al., 2022), this process focuses on the point at which new knowledge is being constructed in Grade 3. Its contribution lies in explicitly identifying the connection between concrete manipulation and generalization. However, the study is limited to theoretical analysis, curriculum analysis, and the development of an illustrative example. The feasibility of the process, the quality of primary students' reflection, and the level of teacher support required should be examined in empirical studies using appropriate observation and assessment instruments.

5. CONCLUSION

This study has proposed a five-step process for organizing new knowledge construction activities in Grade 3 Geometry and Measurement based on experiential learning theory. The process begins by identifying the expected learning outcomes and primary students' prior experience, continues with the design of tasks and learning materials, engages primary students in concrete experience, supports observation and reflection to construct knowledge, and then provides immediate application to verify their understanding. Reflection and generalization are central because they transform the outcomes of manipulation into mathematical knowledge.

The example of constructing the rules for calculating the areas of rectangles and squares shows that an experience needs to generate data for primary students to analyze, rather than merely create interest or a manipulative product. The process can be adapted to other Grade 3 Geometry and Measurement topics, but its application should be based on the expected learning outcomes, primary students' cognitive capacity, and classroom conditions. Further studies should evaluate the process across different lessons and groups of primary students to determine its feasibility and the adjustments required.

REFERENCES

1) Ministry of Education and Training. (2018). General Education Curriculum in Mathematics (Promulgated under Circular No. 32/2018/TT-BGDĐT dated December 26, 2018).
2) Dao Thi Minh Ngoc, Nguyen Thi Hang. (2018). Experiential learning: Theory and application to the design and organization of experiential activities in school subjects. Journal of Education, 433, 36-40.
3) Dewey, J. (1938). Experience and education. Macmillan.

4) Kolb, A. Y., & Kolb, D. A. (2005). Learning styles and learning spaces: Enhancing experiential learning in higher education. Academy of Management Learning & Education, 4(2), 193-212. https://doi.org/10.5465/AMLE.2005.17268566
5) Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice-Hall.
6) Morris, T. H. (2020). Experiential learning: A systematic review and revision of Kolb's model. Interactive Learning Environments, 28(8), 1064-1077. https://doi.org/10.1080/10494820.2019.1570279
7) Schunk, D. H. (2020). Learning theories: An educational perspective (8th ed.). Pearson.
8) Tong, D. H., Loc, N. P., Uyen, B. P., & Cuong, P. H. (2020). Applying experiential learning to teaching the equation of a circle: A case study. European Journal of Educational Research, 9(1), 239-255. https://doi.org/10.12973/eu-jer.9.1.239
9) Tran Thi Gai. (2017). Applying David Kolb's experiential model to develop a cycle of experiential activities in high school biology teaching. VNU Journal of Science: Education Research, 33(3), 1-6.
10) Uyen, B. P., Tong, D. H., & Lien, N. B. (2022). The effectiveness of experiential learning in teaching arithmetic and geometry in sixth grade. Frontiers in Education, 7, 858631. https://doi.org/10.3389/feduc.2022.858631.

There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non-Commercial 4.0 Intenational (CC BY-NC 4.0) (https://creativecommons.org/licenses/by-nc/4.0/), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.