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Organizing Grade 3 Geometry and Measurement Teaching Through Real-Life Situations

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ABSTRACT: This study investigates the organization of Grade 3 Geometry and Measurement teaching through real-life situations in primary mathematics education. Grounded in the principles of Realistic Mathematics Education, the study aims to develop pedagogical measures that connect mathematical content with meaningful everyday contexts and support students' active learning. A mixed set of research methods was employed, including document analysis, classroom observation, questionnaire survey, expert consultation, pedagogical experimentation, and descriptive statistics. Based on the analysis of curricular content and teaching practice, three pedagogical measures were proposed: designing real-life introductory activities, designing activities for applying mathematical knowledge in practical contexts, and constructing a system of real-world mathematical tasks. The findings indicate that these measures are feasible for classroom implementation and show positive effects on students' engagement, learning outcomes, and ability to apply mathematics in real-life situations. The study contributes a context-based instructional approach to Grade 3 Geometry and Measurement teaching and offers practical implications for improving competence-oriented primary mathematics education.

KEYWORDS: Grade 3; Geometry and Measurement; real-life situations; Realistic Mathematics Education; primary mathematics education.

I. INTRODUCTION

The current reform of general education in Vietnam emphasizes competency development, educational innovation, and the connection between school learning and real-life practice (Central Executive Committee of the Communist Party of Vietnam, 2013). In this orientation, the 2018 General Education Curriculum requires school subjects not only to provide knowledge and skills but also to create opportunities for students to apply what they learn to practical situations and everyday life (Ministry of Education and Training, 2018b). For mathematics education, this implies a shift from a solely content-based approach toward one that supports students' mathematical thinking, problem solving, and application of mathematics in meaningful contexts (Ministry of Education and Training, 2018a).

Within the primary mathematics curriculum, Geometry and Measurement occupies an important position because it is closely associated with the physical and social world experienced by young learners. This content strand enables students to observe, describe, compare, estimate, measure, and solve simple problems related to shapes, quantities, and spatial relationships. In Grade 3, Geometry and Measurement is not limited to the recognition of geometric figures or the performance of routine measurement tasks; it also provides opportunities for students to use mathematical knowledge in situations that are familiar and experientially meaningful (Ministry of Education and Training, 2018a). Therefore, this strand has strong pedagogical potential for organizing teaching in ways that connect mathematical learning with students' daily lives.

A relevant theoretical foundation for this orientation is Realistic Mathematics Education (RME). From this perspective, mathematics is viewed as a human activity, and mathematical learning should begin with situations that are meaningful to learners rather than with ready-made formal knowledge (Freudenthal, 1973, 1991). Students are expected to progressively reinvent mathematical ideas through guided activity, contextual exploration, and mathematization. Later developments of RME further emphasized the importance of contexts, guided reinvention, progressive formalization, and the use of mathematics in practical situations as central principles of instruction (Treffers, 1987; Streefland, 1991; Gravemeijer, 1994; de Lange, 1996). In this sense, real-life situations are not merely illustrative examples added after instruction, but integral components of the learning process through which students construct and apply mathematical understanding.

This view is also consistent with broader educational theories that stress experience and active learning. The educational value of experience has long been emphasized in progressive education, where meaningful learning is closely tied to learners' interaction

with their environment (Dewey, 1938). Likewise, the theory of instruction highlights the active role of learners in constructing knowledge through organized engagement with content and learning situations (Bruner, 1966). In primary mathematics education, these perspectives support the idea that students should learn through activities that involve observing, exploring, measuring, comparing, and reasoning in contexts that are close to their own experiences. For Grade 3 students in particular, such situations can serve as an effective bridge between intuitive understanding and more explicit mathematical thinking.

However, in classroom practice, the teaching of Geometry and Measurement at the primary level may still be dominated by explanation, repetition, and decontextualized exercises. As a result, the connection between mathematical knowledge and practical situations is not always sufficiently emphasized, and students may have limited opportunities to experience mathematics as meaningful and applicable knowledge. This gap between curricular orientation and teaching practice suggests the need for pedagogical measures that are theoretically grounded, instructionally clear, and feasible in real classroom settings. For that reason, this study focuses on organizing Grade 3 Geometry and Measurement teaching through real-life situations. The study aims to clarify the theoretical basis of this orientation, analyze the relevant content in the primary mathematics curriculum, and propose pedagogical measures for classroom implementation. By doing so, the study is expected to contribute both theoretical support and practical guidance for improving the quality of primary mathematics teaching.

II. RESEARCH METHODS

2.1. Research design

This study employed a mixed-methods design, combining theoretical analysis and empirical research. The theoretical component focused on reviewing documents related to Realistic Mathematics Education, teaching mathematics through real-life situations, and the Grade 3 Geometry and Measurement content in the Vietnamese primary mathematics curriculum. The empirical component aimed to investigate current teaching practices and examine the feasibility and effectiveness of the proposed pedagogical measures.

2.2. Participants

The survey involved 25 Grade 3 teachers from five primary schools in Hiep Hoa District, Bac Ninh Province, Vietnam. The pedagogical experiment was conducted with four Grade 3 classes from two primary schools, including two experimental classes and two control classes. The total number of participating students was 136.

2.3. Research methods

The study used the following methods: document analysis, classroom observation, questionnaire survey, expert consultation, pedagogical experimentation, and descriptive statistics. These methods were used to establish the theoretical framework, investigate the current situation, and evaluate the proposed instructional measures.

2.4. Experimental procedure

The experiment was implemented through six steps: analyzing curriculum content and developing an experimental plan; selecting participating schools and classes; preparing lesson plans and teaching materials; conducting a pre-test; implementing the teaching intervention in experimental and control classes; and conducting a post-test followed by data collection and comparison. In the experimental classes, three measures were applied: designing real-life introductory activities, designing application activities in practical contexts, and constructing real-world mathematical tasks.

2.5. Data collection and analysis

Data were collected through classroom observations, teacher interviews, and written tests administered before and after the experiment. The results were analyzed using descriptive statistics and qualitative interpretation. Students' scores were grouped into four levels: 9–10, 7–8, 5–6, and below 5, in order to compare the experimental and control groups.

III. RESEARCH RESULTS

3.1. Some Concepts

3.1.1. Real-Life Situations, Real-Life Contexts, and Real-World Mathematical Tasks

A real-life situation can be understood as a situation containing practical elements that requires learners to act, think, and solve an emerging problem. In mathematics education, such situations serve as meaningful starting points for students to connect school mathematics with daily experience. A real-life context refers to the surrounding conditions, circumstances, and relationships in which a practical situation is embedded. In this sense, a context provides the background that makes a mathematical task meaningful, while the situation frames the problem to be addressed (Nguyen & Phan, 2020; Pham, 2021).

A real-world mathematical task is a task derived from real-life situations or contexts in which students need to use mathematical knowledge and skills to interpret, solve, or explain a practical problem. In primary mathematics, such tasks are important because they help students recognize the value of mathematics in daily life, mobilize prior knowledge, and develop the ability to apply mathematics in meaningful contexts. Therefore, organizing teaching through real-life situations is not simply a matter of adding

practical examples to lessons, but a way of designing learning so that mathematical understanding is formed and strengthened through experience and application.

3.1.2. Teaching Geometry and Measurement through Real-Life Situations

Teaching Geometry and Measurement through real-life situations is an instructional orientation in which mathematical ideas are introduced, explored, and applied through contexts that are familiar and meaningful to students. This orientation is closely related to the principles of Realistic Mathematics Education, which views mathematics as a human activity and emphasizes learning through meaningful contexts, guided reinvention, and mathematization (Freudenthal, 1991; Gravemeijer, 1994).

In primary education, this orientation is particularly appropriate because Geometry and Measurement is closely linked to objects, shapes, movements, sizes, and measurable quantities in students' everyday lives. When students learn through real-life situations, they are not only more motivated to participate in learning activities but also more able to observe, compare, estimate, measure, and apply mathematical knowledge in practice. Thus, teaching through real-life situations contributes to the development of mathematical competence, especially the ability to connect mathematics with everyday experience.

3.2. The Grade 3 Geometry and Measurement Strand in the Vietnamese Mathematics Curriculum

In the Vietnamese primary mathematics curriculum, Geometry and Measurement is one of the core content strands and plays an important role in helping students develop spatial awareness, recognize geometric forms, use measurement tools, and solve simple practical problems. In Grade 3, this strand includes knowledge and skills related to plane figures, perimeter, area, length, mass, capacity, time, and other measurable quantities. These contents provide many opportunities for students to observe, manipulate, estimate, calculate, and solve tasks connected with their daily life (Ministry of Education and Training, 2018a).

From a pedagogical perspective, Grade 3 Geometry and Measurement is highly suitable for teaching through real-life situations for at least three reasons. First, the content is closely related to students' immediate environment, such as objects at home, in the classroom, and in the schoolyard. Second, many topics in this strand can be introduced and reinforced through concrete experiences, visual representations, and practical tasks. Third, the content creates favorable conditions for developing students' mathematical application, problem-solving ability, and interest in learning mathematics. Therefore, this strand offers a strong basis for designing context-based teaching activities in primary education.

3.3. Some Pedagogical Measures for Organizing Grade 3 Geometry and Measurement Teaching through Real-Life Situations

Organizing mathematics teaching through real-life situations requires pedagogical measures that are theoretically grounded, developmentally appropriate, and feasible in classroom practice. Based on the principles of Realistic Mathematics Education and the characteristics of Grade 3 students, this study proposes three pedagogical measures: designing real-life introductory activities, designing application activities in practical contexts, and constructing a system of real-world mathematical tasks. These measures aim to support students in exploring new knowledge, consolidating learned concepts, and applying mathematics in meaningful situations. They also reflect the orientation of competency-based teaching by emphasizing active learning, interaction, and mathematical application.

3.3.1. Measure 1: Designing Real-Life Introductory Activities

1) Purpose

This measure aims to create learning motivation and prepare students to approach new knowledge through practical and familiar situations. A well-designed introductory activity helps students activate prior experience, recognize the relevance of mathematics, and form an initial need to learn.

2) Implementation

First, the teacher identifies the lesson objective and the key mathematical idea to be introduced. Second, an appropriate real-life situation is selected from students' familiar environments, such as home, school, or daily activities. Third, the teacher designs prompts, questions, images, stories, or videos that can stimulate curiosity and encourage observation and discussion. Finally, the teacher evaluates students' responses and adjusts the introductory situation if necessary to ensure that it effectively leads to the intended mathematical content.

3.3.2. Measure 2: Designing Activities for Applying Mathematical Knowledge in Practical Contexts

1) Purpose

This measure aims to help students consolidate and deepen learned knowledge by using it in familiar practical situations. It also supports the development of mathematical application and problem-solving abilities.

2) Implementation

First, the teacher determines the knowledge and skills that need to be reinforced after the main lesson. Second, a real-life context closely related to students' experiences is selected. Third, the teacher designs a task in which students need to use Geometry and Measurement knowledge to solve a practical problem. Fourth, students are encouraged to present, explain, and compare their solutions. Through this process, students not only practice mathematical skills but also understand the value of mathematics in everyday life.

3.3.3. Measure 3: Constructing a System of Real-World Mathematical Tasks in Grade 3 Geometry and Measurement

1) Purpose

This measure aims to provide students with diverse opportunities to connect mathematical knowledge with practical problems. A well-designed system of real-world tasks can strengthen students' ability to identify mathematical aspects in real situations, select appropriate methods, and apply learned knowledge flexibly.

2) Implementation

First, the teacher studies the lesson content and identifies the required learning outcomes. Second, suitable real-life contexts are selected on the basis of students' age characteristics and daily experiences. Third, mathematical tasks are designed so that the content, data, and language are appropriate for Grade 3 students while still preserving practical meaning. Finally, the task system is reviewed, tested, and revised when necessary to ensure its pedagogical suitability and classroom feasibility.

IV. CONCLUSIONS

This study examined the organization of Grade 3 Geometry and Measurement teaching through real-life situations in primary mathematics education. The findings indicate that this instructional orientation is theoretically grounded and pedagogically appropriate for the characteristics of the Geometry and Measurement strand, which is closely connected with students' everyday experiences and offers rich opportunities for mathematical exploration and application.

Based on the analysis of theoretical foundations, curriculum requirements, and classroom practice, the study proposed three pedagogical measures: designing real-life introductory activities, designing activities for applying mathematical knowledge in practical contexts, and constructing a system of real-world mathematical tasks. These measures were developed in alignment with the 2018 Mathematics Curriculum, the cognitive characteristics of Grade 3 students, and the practical conditions of primary classrooms. They are intended to support active learning, strengthen the connection between mathematics and life, and foster students' ability to apply mathematical knowledge in meaningful situations.

The pedagogical experiment provided initial evidence for the feasibility and educational value of the proposed measures. The results suggest that organizing Grade 3 Geometry and Measurement teaching through real-life situations can contribute positively to students' learning engagement, learning outcomes, and mathematical application in practice.

In conclusion, the study contributes both theoretically and practically to context-based mathematics teaching at the primary level. It provides a useful reference for teachers in designing and organizing Geometry and Measurement lessons toward competence development and stronger connections between school mathematics and real life. Further research may extend this approach to other mathematical strands and broader educational contexts.

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