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PROCESS OF DESIGNING PRACTICAL AND EXPERIENTIAL ACTIVITIES IN TEACHING MATHS AT GRADE 4th

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ABSTRACT

Vietnam has been implementing a comprehensive reform of the general education program since 2018. In particular, the viewpoint of developing the mathematics program is to ensure streamlining, practicality, and modernity. The program focuses on application, connection with practice or other subjects or other educational activities; expressed through practical and experiential activities in mathematical education in many different forms. The article presents general issues about practical and experiential activities (concepts, forms of organization, meaning) and analyzes opportunities to organize experiential and practical activities in teaching Mathematics in Grade 4th, case study in Viet Nam. On that basis, a process for designing and organizing experiential and practical activities was proposed for primary school students to ensure 4 principles when designing.

KEYWORDS: Primary school, practical and experiential activities, Mathematics, Grade 4th, experiential activities

1. INTRODUCTION

Vietnam's Mathematics program after 2018 spends appropriate time conducting practical and experiential activities for students such as conducting learning topics and projects on Mathematics, especially topics resources and projects on applying mathematics in practice; organizing maths games, maths clubs, forums, seminars, and competitions about Maths; ... Those activities will help students apply knowledge, knowledge, skills, and attitudes accumulated from mathematical education and personal experiences into real life in a creative way.

In Vietnam's math curriculum, Math 4 opens a new phase of maths teaching in primary schools. The period of grades 4th and Grade 5th can be considered a period of deep learning (compared to the period of grades 1st, grade 2nd, and grade 3rd). In grades 4th and grade 5th, students still learn basic knowledge and skills of Maths but at a deeper, more general, and more explicit level. One of the innovations in maths teaching in the 4th and 5th grades of the primary school program is not overemphasized theory and academics as before. In contrast, teachers try to create conditions to

streamline content, increase practical and applied activities, and increase practical materials in the content" [6]. To do that, one of the new points mentioned in the Maths curriculum is to organize experiential and practical activities.

In the world, the educational theory of learning through experiential and practice has appeared since ancient times. According to Albert Einstein, "The only source of knowledge is experience"

In addition, viewpoints on educational methods that emphasize practice, application, and teaching must ensure the connection with reality and education through games, activities outside the classroom, in nature, and education. Integrated engineering and education combined with the productive labour of psychologists; educational science continues to develop strongly.

2. RESULTS

2.1. Practical and experiential activities

2.1.1. Concept

According to Bui Ngoc Diep, "Experiential practice activities are social and practical activities that come to the educational environment in schools for students to autonomously experience in the collective, thereby forming and implementing qualities, abilities, recognizing talents, interests, passions, revealing and adjusting personality and values; Recognize yourself and your own development tendencies" [4].

According to Lien N.T et al: "Experiential practice activities are an educational path that combines theory with practice, learning along with the practice, contributing to the development of qualities, thoughts, will, emotions, and values, life skills, and correct beliefs in students, thereby forming and developing students' abilities and qualities, helping students develop their comprehensive personality" [15].

Approaching the above viewpoints, we believe that: "Experiential practice activities in Mathematics are educational activities, in which the teacher is the one who designs, organizes, and guides to help students mobilize and synthesize mathematical knowledge. Learners know how to explore and discover to successfully solve real-life situations, thereby forming their qualities and abilities.

2.1.2. Roles of Experiential Practice Activities

Experiential practice activities are very important in the new Vietnamese general education program. This activity helps students have many experiential opportunities to apply the knowledge they have learned into practice, thereby forming their necessary competencies. Experiential practice activities help students directly participate in activities, observe, analyze, and predict subject situations linked to reality to discover new knowledge and transform learning experiences on their own under the direction of the teacher. It can be said that this is an effective learning method to develop learners' abilities. On the other hand, experiential practice activities also focus on forming and developing specific abilities such as organizing activities, organizing and managing life, being active in cognitive activities, and orientation students' career choices.

For math, experiential practice activities have the following roles:

(i) Create many opportunities to help students promote positivity, initiative, and creativity'

Experiential practice activities are organized with a series of learning activities, thereby these activities help students discover unknown things without having to passively absorb knowledge. In this spirit, teachers do not provide or impose existing knowledge but rather organize and direct students to conduct learning activities such as recalling old knowledge, discovering new knowledge, and creatively applying knowledge in learning situations related to real-life situations, etc. Teaching focuses on training self-study methods, focusing on training students with methodological knowledge in which students know how to self-study textbooks and learning materials, identify existing knowledge, and explore and discover new knowledge. Thereby students develop thinking operations such as analysis, synthesis, and specialization, and they gradually form and develop students' creative potential. Create a positive learning environment for students to discover and explore new knowledge, students actively participate in all stages of the activity process from activity design to preparation, implementation, performance, and evaluation of results. It also creates opportunities for children to experience and express opinions and ideas; evaluate and choose activity ideas, express and assert themselves, thereby forming their necessary qualities and abilities.

ii) Create favorable conditions for students to approach learning from an integrated perspective

Experiential practice activities in teaching Mathematics in primary schools provide the best opportunities for teachers and students to engage in integrated learning and teaching. Through hands-on experiential activities, each student can enhance their knowledge, skills, and critical thinking abilities, gradually tackling learning challenges and real-life problems. Students are required to utilize a blend of knowledge and skills not only within Math but also across other subjects to successfully complete these activities. For effective mathematics teaching practice and experience, teachers must select appropriate levels and forms of integration tailored to each teaching topic and aligned with the students' abilities in their classroom.

iii) Establish a platform for students to collaborate, exchange, and interact with entities both within and beyond the school

The organization of experiential activities in teaching Mathematics attracts the participation, coordination, and connection of many educational forces inside and outside the school. Depending on the thematic content, lessons, and nature of activities, the participation of forces can be direct or indirect; they can be the host, focal point, or coordinator; they can be involved in different aspects (such as support in funding, facilities, location for organizing activities, or contributions of expertise, intelligence, or spiritual support, consulting, providing information, numbers, etc.). In essence, this is the interaction between subjects in the active learning environment of experiential practice activities. To carry out these activities, not only does it require each student to study on their own, but it also requires coordination and sharing between students and many subjects about learning experiences to achieve the set goals.

iv) Help students acquire experiences that are unattainable through other means

Engaging in experiential learning activities enables students to acquire knowledge by actively participating in tasks rather than solely focusing on outcomes. When learning mathematics through experiential practice, each student is given the chance and responsibility to engage with learning materials independently. Every success or setback encountered during these activities serves as a valuable learning experience for students to progress towards their educational objectives. Understanding the historical context of human society and the world around us through various perspectives is a key aim of educational endeavors. Nevertheless, there are certain experiences that can only be grasped through hands-on practice. Diverse experiences provide students with a wealth of opportunities, fostering a curiosity for exploration and innovation; Encouraging students to embrace positivity, take initiative, and build confidence as they uncover the principles governing the natural world.

2.1.3. Experiential practice activities in Mathematics

Experiential practice activities come in various forms, including club activities, game organizations, forums, interactive stages, field trips, competitions, exchange activities, humanitarian activities, volunteer activities, community activities, collective activities, public labor, theater, sports, and organizing festivals. Each of these activities holds educational significance.

(i) Organize hands-on practice activities during math lessons

This is perhaps the simplest and most effective way to structure experiential teaching within the current physical and educational context of primary schools. Experiential learning activities can be conducted in a limited classroom setting under the teacher's guidance, allowing students to engage, interact, and explore new knowledge collectively. During this process, the teacher serves as the facilitator while the students take on the roles of hosts, leaders, and executors. However, this initial approach to experiential learning may hinder the full development of students' abilities, particularly those who may not be fully engaged in the learning process. Therefore, it is essential for teachers to employ engaging organizational methods that cater to all students in order to foster the development of their abilities.

ii) Arrange exchange activities in math extracurriculars

Exchange activities among students, as well as between students and teachers, both inside and outside of class, are a natural and inevitable form of interaction among individuals. Additionally, extracurricular activities are also a part of the educational system in schools. Therefore, the process of teaching and learning inherently involves these types of activities.

iii) Organize practice of applying mathematics

Learning Math helps students apply knowledge to successfully and effectively solve real-life situations. Within the school, practicing mathematics is the beginning of this process. Through this, students have the need and opportunity to experience activities using mathematical tools to solve practical problems.

iv) Project-Based Learning in Mathematics

The characteristic of project-based teaching is suitable for organizing learning through experiential activities. The content of the learning projects combines knowledge from various subjects and fields, creating favorable conditions to connect Mathematics with practical experiences in different areas of life. Project-based teaching can be conducted within a group or a class, but it can also extend beyond the classroom setting, providing a good opportunity to overcome time and situational constraints in math education when organizing experiential activities in a broader space and environment. Creating an interactive learning environment is conducive to multidirectional interactions: between teachers and students, among students themselves, etc. This is particularly important when teaching through students' experiential activities. In practice, when implementing project-based learning, students are motivated and actively engage in their activities to explore and understand Mathematics. Therefore, engaging in the process of constructing and implementing a learning project inherently provides opportunities for students to seek and carry out experiential activities naturally.

2.1.4. Opportunities for experiential learning activities in Mathematics for Grade 4th students in Vietnam

Teachers can seize opportunities to organize experiential learning activities for Grade 4th students in teaching Mathematics with the following contents:

a) Experiential learning activities for measuring units

Opportunities to organize experiential learning activities in real-life situations using common tools to practice weighing, measuring, counting, performing conversions, and calculations with various units of length (mm, cm, dm, m, km); area (mm², cm², dm², m²); weight (g, kg, ton); volume (ml, l); time (second, minute, hour, day, week, month, year, century); Vietnamese currency learned to apply in solving activities closely related to students.

For example: Visiting a science exhibition and being guided in making a water filter bottle, students observe the materials used in the exhibition to identify, calculate, and convert measurement units to create the product. This allows students to easily understand the main steps in making a water filter bottle. Therefore, this is an opportunity for teachers to utilize practical experiential activities related to real-life situations.

b) Practicing estimation in mathematics

Opportunities for organizing experiential activities in real-life situations where students apply their knowledge of numbers and calculations, geometry, and measurements to practice estimating various real-life scenarios such as estimating the number of visitors to a park, estimating the area of a zoo garden. These activities are closely related to students, indirectly helping them develop knowledge; it is a good opportunity for students to apply the mathematical knowledge they have learned in practice.

Practice experiencing the collection, analysis, and representation of statistical data through simple scenarios where students apply statistical knowledge to gather data, compare data, calculate the average of the collected data to choose appropriate solutions for practical situations. For example,

collecting corn yields from different fields with different care processes, analyzing and comparing the data to select a common procedure to achieve the best yield.

2.2 Design experiential practice activities in teaching Mathematics

2.2.1. Principles of designing experiential practice activities in teaching Mathematics

- Associated with situations from real life;
- Relevant to local problem-solving;
- Experience topics align with students' knowledge;
- Teachers serve as supporters and guides.

2.2.2. Process of designing

Based on the objectives of the practical experiential activities program and the characteristics of knowledge in the 4th-grade Mathematics curriculum in general education; considering the requirements for students' qualities and competencies; applying Kolb's experiential learning model; some research works at home and abroad; we propose the process of designing experiential practical activities for Grade 4th students in Mathematics as follows:

Step 1: Find out the student's level and understanding

The goal of teaching Mathematics in general and teaching experiential practice activities in particular is to develop qualities and abilities for students. To know whether students' abilities have developed or not, a requirement is: Teachers must determine the students' initial level before entering school to then determine appropriate and suitable post-lesson requirements. . Furthermore, in David Kolb's experiential learning cycle, students participate in the first activity which is "specific experience" based on knowledge and life experience. Therefore, teachers need to see the level and understanding of students about the surrounding life to answer the questions: When participating in this experiential practice activity, what do students have the opportunity to do? create what? What understanding do students have about this? Have you ever done that? Therefore, when designing experiential practice activities, teachers first need to find out what knowledge and skills they have learned that are related to new knowledge, and what understanding of surrounding life helps students understand and solve problems. problems, situations, etc. This also helps teachers identify suitable goals and tasks, creating excitement for students.

For example: Before having the idea of organizing experiential practice activities: Practicing putting together and forming puzzles, teachers find out: What shapes and blocks have students learned? What objects and characters do students like? Have you ever arranged and matched pictures? ...

Step 2: Determine the purpose and content of the experience

Based on students' awareness and understanding of surrounding life, teachers need to determine students' learning goals: After this lesson, what can students do? What problems does it solve? Students have the opportunity to reveal and develop general qualities and general abilities, mathematical abilities. The goals need to be clear, affordable to students and include the process and product with the quality criteria to be achieved.

After determining the purpose, teachers need to rely on the content of experiential practice activities specified in the Mathematics Curriculum (according to the 2018 General Education Program) to determine the design content to suit the goals and objectives. math topics; students' abilities, interests, and learning styles; the actual conditions of the classroom or school...

For example: Based on the results the teacher has in Step 1, the teacher determines the learning goal: After finishing the lesson, students will achieve the following requirements:

- Practice and experience folding and combining cardboard shapes into houses and bridges.
- Train and develop qualities: hard work, responsibility; Collaboration capacity, mathematical problem solving, mathematical modeling, and use of mathematical learning tools and media.

Regarding the content, the teacher determines the content: designing a house and bridge using cardboard.

Step 3: Anticipate the form of experience

Teachers rely on the goals and content to make ideas and choose an organizational form to help students carry out the experiential content and achieve the determined experiential purpose. Teachers can choose games, competitions, interactive stages, clubs, ...

For example: With the purpose and content determined above, the teacher comes up with an idea for a learning format: a competition between groups in the class.

Step 4: Plan experiential practice activities

Teachers build and design learning activities so that students can participate in practice and experiential activities. From there, teachers will determine appropriate teaching activities for students. Experiential practice activities of students need to be considered by teachers and planned according to David Kolb's experiential learning cycle:

- Specific experience: Teachers need to answer the question: In the activities students participate in, teachers need to ask questions to evaluate the "experience" and effectiveness of organizational activities. Specifically:

- + What mathematical knowledge and skills have students been able to apply?
- + Is the problem raised in this activity close and familiar to students?
- + What can students practice? After each implementation, can students learn from experience for the next time?
- + Do students use their senses to perceive, explore, and solve problems?
- + Do students feel interested, happy, and comfortable? ...

- Observe and reflect: Experiential activities must have an educational purpose. Therefore, teachers need to organize for students to observe, state, and reflect on the results of the observed process, and explain those results based on the mathematical knowledge and skills they have learned or experience

and understanding of mathematics. to observe and make comments. Teachers should plan questions to use to guide students' observation and reflection activities.

- Forming concepts and solving problems: Through the results of observation and reflection, teachers guide students to discover new knowledge, skills, and ways to solve problems.
- Active experimentation: Teachers organize students to continue participating in previous experiential activities or other experiences based on new concepts and new ways of solving problems.

Notes:

- The operations in the above cycle will be demonstrated depending on the form of experience that the teacher has chosen.
- When planning these activities, teachers need to analyze opportunities to develop students' mathematical qualities and abilities as identified in the goals.
- Teachers also need to anticipate pedagogical situations that may arise while students participate in these activities.
- Teachers need to plan appropriate regular assessment methods and tools.

Step 5: Present the lesson plan

After planning the experiential practice activities, the teacher will present the product in handwritten, typed form or exploit information technology applications to design. In this product, teachers will present the suggested structure of Math lesson plans in Official Dispatch 2345 of the Ministry of Education and Training. The structure includes:

- Requirements to be met: (Write the purpose and content together);
- Prepare materials (teachers base on the planned practical and experiential activities to determine the means and materials for students to practice and experience);
- Main teaching activities;
- Adjustment (if any).

3. CONCLUSION

Building a process for designing experiential practice activities for students in teaching Maths in Grade 4th creates favorable conditions for students to learn and apply the knowledge they have learned in real life. Practicing in different learning environments from a very early age creates a confident mindset and shapes students' adaptive capacity to suit real-life situations. The practical effectiveness of the process of designing experiential practice activities for students in teaching Maths in Grade 4th lies in the process of designing this activity for students. The activities are designed to have a positive impact on students' self-study and self-training proactively and effectively because the best way to gain capacity is for students to study and practice on their own.

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