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DESIGNING THE EFFECTIVE TEACHING SITUATIONS FOR THE MATH AT PRIMARY SCHOOL

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INTRODUCTION

1. REASONS FOR SELECTING RESEARCHED ISSUE

1.1. Effective teaching and teaching situations have been studied by many authors from different angles but the effective teaching situations have not been thoroughly studied

In our country, since the 1960s, in the study of theory and application of "the problematic teaching", the writers such as Pham Van Hoan, Nguyen Ba Kim, Nguyen Huu Chau, Do Dinh Hoan,…all refer to the construction of the problem-solving teaching situation. Many theses on teaching mathematics also discuss about designing the teaching situations of teacher such as the doctor thesis of Le Ngoc Son, Pham Thi Thanh Tu, Nguyen Tien Trung,… These studies mainly studied to develop teaching situations in order to improve the quality of teaching mathematics but little attention has been paid to the development of learner capacity.

On the subject of teaching mathematics effectively, there have been some works of many authors in and outside the country such as Good, Grouws and Ebmeier (1983); Rosenshine and Furst; Barak Rosenshine; Bui Van Nghi (2009); ... from different angles.

However, in the aforementioned works, there is no mention of effective teaching situation – as a core component of effective teaching.

1.2. Effective teaching situations are important for learners.

Teaching for capacity development is an indispensable trend in education today, includes: identifying goals, creating teaching situations, addressing problems, problem-solving orientation, helping students solve problems, examining and evaluating how problem solving. Creation of teaching situations is critical in teaching for capacity evelopment. Accordingly, effective teaching situations consist of a series of targeted, pedagogical activities designed to develop students' capacity. Therefore, good elementary school mathematics instruction requires effective instructional situations in which students engage in activities in an interactive environment for self-knowledge acquisition, capacity development.

1.3. Effective teaching situations play an important role for teachers

Obviously, Teaching needs to achieve the effectiveness of this process. Therefore, when teachers use teaching situations, they need to create and

exploit teaching situations effectively. For this reason, Mathematics teachers in Primary Schools need to be aware of what is an effective teaching situation, how to design and how to use effective teaching situations ... in the process of conducting teaching activities. Effective teaching situations allow teachers to "chain" their understanding and teaching skills towards the same goal: Make the teaching process of mathematics in primary school achieve the desired effect.

1.4. Teaching mathematics in elementary school by using effective teaching situations is a new problem so it will be difficult

On the teacher side, due to insufficient understanding of effective teaching situations, design and use, leading to psychological hesitation change, if any, the teaching situations offered are also form. On the student side, due to the familiarity with learning to acquire passive knowledge, there are obstacles to self-discovery, discovery, cooperation, sharing in solving teaching situations posed in the learning process. In addition, teaching mathematics in primary schools by effective teaching situations poses new requirements on facilities, teaching aids, class sizes ... Is not that a challenge?

For the reasons mentioned above, we chose the topic "Designing the Effective teaching situations for the math at primary school" to research.

2. PURPOSE AND RESEARCH TASKS

2.1. Research purposes

Based on theoretical and practical research, the concepts, signals of an effective teaching situations, and the steps to design effective learning situations for the math at primary school. From there, help teachers design and use effective teaching situations in teaching math in elementary schools.

2.2. Research mission

- Research theories on effective teaching and effective teaching situations.
- Understanding the situation of teaching math in elementary school: The teachers use teaching situations, the quality of teaching mathematics from the perspective of effective teaching.
- Giving the concept, the signs of an effective teaching situations about math at primary school.
- Identify the steps to design of effective teaching situations for the math at primary school.

- Propose measures to help elementary school teachers design and use effective teaching situations in teaching mathematics.

- Experimental pedagogy tests the feasibility of the proposed solution.

3. THE SUBJECT AND OBJECT OF STUDY

- Study object: the Teachers' Math Teaching Activities, Mathematics Activities of Elementary Students.

- Study subject: the effective teaching situation about Math.

4. SCIENTIFIC EXPERIMENTAL

If clarifying the concept, identify the signs and how to design, use effective teaching situations in elementary school will help teachers design and use effective teaching situations, and improve the quality of mathematics instruction in primary schools.

5. QUESTION ON RESEARCH

1) What are the effective teaching situations in teaching math in elementary school?

2) To design, use effective teaching situations in teaching math in elementary school, how to do?

3) What measures should be taken to help teachers design and use effective teaching situations in teaching mathematics in elementary school?

6. RESEARCH METHODOLOGY

* Research theories

* Investigation, observation

* Experimental pedagogy

7. SIGNIFICANCE OF RESEARCH, NEW CONTRIBUTION OF THEMES

7.1 Significance of research

Contribution to the development of teaching Mathematics capacity of elementary teachers and general teaching capacity, the capacity of teaching Mathematics in particular for primary students is to improve the quality of learning Mathematics for students, meet the requests of full change in Education in the current stage.

7.2 New contribution of themes

* For reasoning: Clarifying concepts, signs of effective teaching situations in primary Mathematics

* For reality:

- Identify steps to design and use teaching Mathematics situations effectively in elementary schools.

- Build some departments to help teachers design and use teaching Mathematics situations effectively in elementary school.

8. THE PROBLEMS TO DEFENSE

- Conception and signal of effective teaching situations in elementary school math.

- The practice and effect of measures helping elementary teachers design and use effective teaching situations in elementary school math.

9. THEMES STRUCTURE

Apart from the Introduction, Reference material and Appendix, the themes includes three chapters:

Chapter 1: Theoretical and practical basis

Chapter 2: Design and use effective teaching situations in elementary school math

Chapter 3: Pedagogical experiments

Chapter 1:
THEORETICAL AND PRACTICAL BASIS

1.1. OVERVIEW OF THE RESEARCH PROBLEM

1.1.1. Foreign research

* Reach from the model perspective and the effect of effective teaching

Good, Grouws and Ebmeier (1983); Good and Grouws (1979) gave some models of "Active teaching" based on effective teacher principle; Askew, M., Brown, M., Rhodes, V., Wiliam, D., & Johnson, D. (1997) have determined that effective teaching leads to improve results of student; Barak Rosenshine has introduced 10 effective teaching principles; Reston, VA (2014) have determined the requirements for teaching Mathematics effectively; Thomas J. Kane; Daniel F. McCaffrey, Trey Miller and Douglas O. Staiger have given the elements to teach effectively.

* Approach from an effective teacher perspective:

Rosenshine and Furst (1973) studied about effective teachers and concluded five most important criteria of effective teachers; Wall (1994)

provided a framework for the self-practice of teachers; Chris Coombes Generation (2013) has introduced 6 criteria of effective teacher teaching.

* Approach from the perspective of effective teaching methods and techniques:

Robert J. Marzano-Debra, J. Pickering-Jane E. (2012) cites effective teaching methods and some teaching techniques; Robert J. Marzano (2011) offers classroom teaching techniques that help students access and gain knowledge.

* Approach from the effective lesson design perspective:

Derived from the work of E. Saito (2009) and other authors in Japan, Case Study is an approach to professional learning. As such, case study is a way to develop teaching capacity, which directly influences the teacher's ability to design instructional situations, with the ultimate goal of enhancing the effectiveness of teaching.

From the above-mentioned directions and results of the study on effective teaching, we find that: *effective teaching has been paid attention by foreign authors very early, developed through each stage, although approaching from many different angles but heading towards the goal to make teaching effective and achieve great result..*

1.1.2. Domestic research

From the mid-decade 90s of the 20th century until now, many local researchers have gone into study to find out how to achieve the highest effectiveness of teaching, such as Nguyen Ba Kim, Tran Thuc Trinh, Nguyen Manh Cang, Nguyen Huu Chau, Pham Van Hoan, Do Dinh Hoan, Le Thi Hoai Chau, Nguyen Chi Thanh, Bui Van Nghi, Hoang Le Minh, Tran Ngoc Lan, Thai Duy Tuyen… with theses refering to the situation. There are some typical research works as following: Thesis of Le Ngoc Son; thesis of Pham Thi Thanh Tu; thesis of Nguyen Tien Trung...

So, there are many research works on the teaching mathematics situation in Vietnam, but neither of them directly studies the solution to implement effective teaching mathematics from the perspective of helping teachers design and use teaching situations effectively.

From the results of foreign and domestic researches, we find it necessary to conduct research to clarify the concept of effective teaching, approach to effective teaching by: On the basis of clarifying conception, structure, and characteristics of effective teaching situations; design steps, how to use teaching situations effectively in teaching mathematics in elementary school.

1.2. EFFECTIVE TEACHING MATHEMATICS SITUATIONS AT ELEMENTARY

1.2.1. Effective teaching

1.2.1.1. Learning activities in the teaching process

Referring to the research, approaching the learning activity from the effective realization of learning objectives, we determine the conditions for effective learning.

1.2.1.2. The concept of effective teaching

According to Chris Coombes Generation Ready (2013): Teaching is really effective when it positively affects student's learning activities. With this concept, it can be seen that: *The effectiveness of teaching lies in organizing active learning activities for students. Therefore, effective teaching is closely relevant to the competence of design teaching situations.*

Research on Effective Teaching Mathematics has Reston. VA; Maria Miller... *Here, the effectiveness of math teaching is closely linked to the student's activities and performance of problem solving as they engage in experiential and cooperative learning activities*. On effective mathematics teachers, there are studies by Pugalee (2001); Zemelman, Daniels, Hyde (1998); Stein (2001). Through that, the core requirements for teachers when wanting to conduct effective teaching is: *Creating a collaborative learning environment; Help students develop the necessary competencies - which emphasize problem solving ability; Help students see the meaning of mathematics in practice*. Glenda Anthony and Margaret Walshaw provide ten principles - seen as ways to make math teaching more effective. In that, in comparison with the practice of teaching mathematics in Vietnam, we claim that some requirements can be applied for teachers to effectively teach: To create a collaborative learning environment; Attach learning needs with the knowledge, skills, experience of the students; The learning content is based on the practical origin and meaning.

From the above research results, within the scope of this thesis, we conceive that: Effective teaching is the teaching that ensures the good results of student learning: *not only develop basic knowledge and skills, but also help students understand the origin and meaning of knowledge; encourage students to actively participate in experiential, self-study and collaborative activities. From there, students are given the habit and ability of applying knowledge into practice, developing the necessary capacities, especially problem solving problem competency.*

1.2.1.3. The relationship among effective teaching, teaching situations, and capacity development orientation

a) Effective teaching contributes to the student development orientation

Effective teaching is directly connected to the student's capacity development orientation, reflected in the following aspects: objectives; content; teaching method; organizational form; assessment.

b) Teaching with situation contributes to effectiveness and development of student's ability

From the purpose of studying the dissertation topic, we view the concept of teaching by situation as the kind of teaching in which teachers and students perform teaching and learning activities through practical teaching situations to achieve the teaching success. From the research result of teaching with case, we become aware of the advantages and benefits of case-based teaching for effective teaching and orienting student's competency development as following: based on student's study, through the activities of penetrating and solving practical situations in the interactive environment, make students interested in learning, easy to understand and remember; Case-based teaching demonstrates the attachment of teaching content to the realities of life, towards the ultimate effective teaching goal; with performance of case-based practical teaching, teaching with situation contributes to the ability development of contact, applying knowledge to solving problems in diverse practices.

1.2.2. Effective teaching situation

1.2.2.1. Teaching situation

In terms of education, people are interested in the concept of teaching situations. There are some conceptions of Danilop M.A., Xkatkin M.N. (1980); Thai Duy Tuyen; Nguyen Ba Kim; Phan Trong Ngo...

From the perspective of studying effective teaching situations in mathematics teaching, we agreed with Nguyen Ba Kim to view teaching situations as a system consisting of subjects (teacher and student) and objects (objective, task, teaching method, activities of teachers and students...). Thus, *a teaching situation is designed with teacher's pedagogical meaning to delegate learning tasks to the learner, as the learner addresses the tasks, they will achieve the certain teaching goal set out.*

1.2.2.2. Effective teaching Math situation in elementary

a) Effective teaching situations

On the basis of clarification of the concept of teaching situations, characteristics and relationships of some types of teaching situations (practive by issue settlement, ideal learning practice, etc) in comparison with the orientation and requirements of current modern education, we'd like to present the concept of effective teaching situations as follows:

The concept "effective teaching situations" refers to bringing students interestes in studying through experiential learning activities, which not only creates the necessary knowledge and skills but also shapes the habit and ability to integrate and apply the knowledge into issue settlement, accordingly, creating conditions for students to achieve teaching goals under the appropriate impacts of the teacher as well as other teaching conditions.

b) Effective teaching situations in elementary school math

To apply for teaching mathematics in elementary, we base on: Characteristics of elementary mathematics; Characteristics of elementary students; Characteristics of teaching math in elementary school, we detail the characteristics and signs of an effective teaching situation in mathematics in primary school as following:

An effective teaching situations in elementary school math should meet the following requirements with the least impact of the teacher and other teaching conditions:

(1) Creating a smooth natural linkage between new knowledge in elementary mathematics with the need of being formed following the goal of the lesson with the student's knowledge and existed experience system with student's pleasure, create student cognitive needs, from which students actively participate in discovery and problem-solving learning.

(2) Flexibly integrate the knowledge and skills of mathematics in elementary education with other relevant subjects as well as practical experiences in student's daily life, create condition to attack Mathematics with the origin and application of mathematics in practice.

(3) There are student experiences in an interactive environment (communication, cooperation, dialogue, etc.) that builds knowledge, skills and develops common capabilities, particular mathematics competency in elementary school. It focuses on developing problem-solving ability, self-learning ability and ability to apply mathematics in practice.

(4) Make students realize the practical meaning of mathematical knowledge and set up habits, the ability to apply mathematical knowledge to solve practical problems.

1.2.2.3. The relationship between effective teaching situations with some related teaching theories.

a) Effective teaching situation with problematic situation and teaching discovery, problem-solving

The problematic situation is a core element of teaching discovery and problem solving - one of the main non traditional teaching tendencies studied and applied today - especially with the requirement of developing capacity for students. The effective teaching situation and the problem-provoking situation has in common: Containing problems, tasks need resolving, cognitive difficulties need overcoming; excitement to find out, solve posed problems; there is a connection between the unknown, the cognitive needs and the knowledge and skills of the student. From this relationship, to design and use teaching situations effectively, teachers should take use of teaching discovery and solving problems, and simultaneously focus on developing problem-solving skills for students.

b) Effective teaching situation with an ideal learning situation

Ideal learning situations and effective learning situations pose problems and problems that need to be addressed for students. However, it is important to transfer the ideal learning situation into pedagogical situations in effective teaching situations.

c) Effective teaching situations with capacity development trends, perform the integrated teaching and learning through creative experiences

Effective teaching situations are essential to effective teaching. Thus, the design and use of effective teaching situations helps teachers fulfill the requirements for developing students' capacity in teaching. With the signs of effective teaching situations, it is possible to see that effective teaching situations associates with the integration of mathematics in elementary and other related subjects as well as practical experience in the daily life of students.

On the other hand, it enables learners to participate in learning through experiential activities in an interactive environment.

1.3. PROBLEMS OF DESIGNING EFFECTIVE TEACHING SITUATIONS IN ELEMENTARY SCHOOL MATH

Discussing the process of designing situations in teaching, there are: Thomas, J. (2003), Waterman, M. & Stanley, E. (2005), (2010), Trinh Van Bieu. From the point of view of designing an effective teaching situations in elementary school math, we find that to design an effective teaching situations in elementary school math we need to concern about the following fundamental issues: *Identifying objectives issue; Content design issue; getting ideas for the situation issue; Designing student's learning activities issue; Organizing the implementation of effective teaching situations issue.*

1.4. PROGRAM CONTENT AND THE EDUCATION TEXTBOOK OF MATH IN PRIMARY

1.4.1. Math content in elementary

The content of mathematics in elementary consists of 5 disciplines: Arithmetic and algebraic elements; Quantity and measure of quantity; Geometric elements; Statistics elements; Mathematic solving.

1.4.2. Characteristics of the mathematics textbook program in elementary

The content structure of mathematics in elementary schools thoroughly grasps the ideas of modern mathematics and is suitable for each stage of development of elementary students.

The Mathematics Program has paid attention to its systematic and rigorous mathematical mode; it is interested in teaching students thinking method; The content of learning mathematics is selected to ensure systematic, strict and

appropriate for elementary student. However, the content of the curriculum and textbooks are still heavy in terms of knowledge and lack of skills, especially the lack of approach towards the development of quality and capacity of learners. The structure is "closed" according to each subject, not open in the relationship of subjects.

1.5. THE REAL STATE OF THE DESIGN AND USE OF TEACHING SITUATION IN ELEMENTARY SCHOOL MATH.

Based on the study of effective teaching situations, with the aim of proposing solutions that help teachers design and use teaching situations effectively, we investigate the state of teaching and learning mathematics at elementary schools including 185 teachers and 200 students in primary schools in Thanh Hoa province, in terms of: *Student characteristics and motivation in learning mathematics; The situation of teaching and learning Math in elementary school; The design and use of teaching situations of primary teacher*. The results show that:

Most teachers find that the design of one hour of mathematics instruction at the elementary level which requires students to be self-conscious, engage in experiential activities in an interactive environment to explore and find out a part of knowledge, thus improving the efficiency of teaching mathematics in elementary schools, is essential. However, in terms of motivation, perception and skills of the design and use of effective teaching situations of primary school teachers are still limited, encountered many difficulties due to many different reasons. Therefore, it is necessary to foster teachers both in terms of their perceptions and skills in designing and using effective teaching situation in elementary school math.

CONCLUSION CHAPTER 1

In Chapter 1, we summarize the issues related to effective teaching and the design of effective teaching situation in elementary school math. Starting from the foreign and domestic history of effective teaching issue research and the design of teaching, we clarify the concept of effective teaching and effective teaching situations. Since then, it is specific to mathematics in elementary school. This is the basis for identifying problems in designing effective teaching situation in elementary school math.

On the other hand, in Chapter 1, we have also outlined the current state of mathematics teaching in primary schools based on the survey of 185 teachers and 200 pupils in 12 elementary schools representing the regions in the Thanh Hoa province. The results showed that: There are teachers who have not mastered the content of the mathematics program, mainly use traditional teaching methods, which are heavy in teaching theory, less emphasis on practical activities as well as less interest in learner's ability development. In addition to subjective reasons, the limited capacity of teachers, especially the ability to design teaching situations effectively, the way of professional management, teacher assessing is objective causes. Due to the lack of technical training in the design of teaching situations in a very formal way, if self-design of teaching situations, these teachers have many difficulties. Students have difficulty moving from passive learning to active learning, self-exploring, find out, collaborating, sharing in solving learning situations posed during learning.

In our opinion, to improve the quality of teaching mathematics in the primary following orientation of capacity development, one of the solutions is to find solutions that affect the teaching capacity of teachers, in that, helping teachers design and use teaching situations effectively is the right direction.

Chapter 2
DESIGN AND USE EFFECTIVE TEACHING SITUATIONS IN ELEMENTARY SCHOOL MATH

2.1. ORIENTATION FOR DESIGN EFFECTIVE TEACHING SITUATIONS IN ELEMENTARY SCHOOL MATH

Orientation 1: Ensure effective teaching of Mathematics, focusing on capacity development for primary students.

Orientation 2: Effective teaching situations according to the characteristics of the elementary Mathematics program.

Orientation 3: Effective teaching situations in accordance with the cognitive characteristics of primary students.

Orientation 4: Ensure the feasibility, effectiveness and systematic nature in learning Mathematics at primary level.

2.2. DESIGNING EFFECTIVE TEACHING SITUATIONS IN ELEMENTARY SCHOOL MATH

2.2.1. Steps and applying steps of designing effective teaching situations in elementary school math

**** Step 1: Determine the purpose of the lesson***

To determine the lesson objectives in effective teaching, teachers should:

- Answer the questions: What knowledge is required in this lesson? Which skills do students need training? What capacity and qualities should be formed and fostered? And refer to these answers to design effective teaching situations.

- Help students find answers to questions (help students create learning goals for themselves): What do you know? What do you want to know? What has been learned recently? How can you apply knowledge?

**** Step 2: Select content to design effective learning situations***

To create an effective learning situation, teachers need to transform the knowledge units that need communicating to the students into a sequence of objective conflicts that arise objectively in the student practice. The content must be originated from a complex problem (difficult but well structured). The content need choosing from different sources (textbooks, workbooks, reference materials) and supplemented with practical content. The content must clearly display context, data, way of presentation.

**** Step 3: Build effective learning situations***

- *Determine the idea of situations*
- *Design activities on the basis of learning tasks*

The teacher based on the information gathered in steps 1,2, along with an analysis and selection of information, identified logic of events, predicted cognitive level, action skills and attitudes ò the students to choose the appropriate activities. Teachers designing learning situations need to define a relatively detailed description of the major activities of teachers and students that take place during the teaching process.

- *Suggest situations*

Situations must be named. The name of situations is based on the objective of the corresponding unit of knowledge in terms of proximity, friendliness, age-appropriation, etc. Organize activities logically with pedagogical intent.

**** Step 4: Consider the feasibility of a practical effective teaching situations designed and adjusted (if needed).***

Consult with colleagues; Edit and complete situation; Deploy and adjust situation in the practice of teaching.

* *Note*: In the case of teaching situation designed and preliminary designed, but considered in comparison with the practice find it difficult and feasible. it is not necessary to return to Step 1 to rebuild.

2.2.2. Illustrate the design of effective teaching situations in elementary school math

Scenario 2: *An effective teaching case for forming new knowledge in the "Chart" lesson (page 28 - Mathematics 4 textbook)*

Step 1: Determine lesson objectives

Students use the knowledge of the data series, data tables to approach and recognize the picture charts. Students are guided to read, analyze, and manipulate simple figures on graph charts. In particular, students understand the meaning, the effect of picture charts and initially applied to solve the practical problems involved. Consequently, students' skills are developed. For instance: cooperative capacity; capacity to learn Mathematics includes: logical thinking capacity, problems solving capacity; capability to use Mathematical language.

Step 2: Select content for designing an effective teaching situation

The content of effective teaching situation comes from the demand to read data, see relationships between data and information from visual images. Accordingly, students need to familiarize themselves with the chart. Content is similar as the content in the textbook but replace the data on the number of vehicles in the students' family. Background: The daily commute activities of the student using their families' vehicles. Data: Student proposes actual data on the number of vehicles in the family. Method: Based on tabulation skill, reading skill, writing skill, data analyzing skill that student has learned from the previous lesson. Students make their own tables of statistics, from which picture charts are formed.

Step 3: Forming an effective teaching situation

- *Determine the idea of situation*

The situation consists of fun activities with stickers so that students can naturally approach picture charts. Choosing situation is the situation associated with the activity of students (tabulation, and find the matching picture).

- *Design activities for students on lesson objectives*

With the ideas and content selected as above, the effective teaching situation is selected and proposed specifically as follows:

Situation designed: Get familiar with picture charts

The group (of 4 students) discuss and do the following tasks:

(1) Fill in the appropriate figures in your family's transportation statistics.

Table 1: Statistics of your family's vehicles in group .....

Your family / *Mean of transportation*	.....	.....	.....	.....
Bicycle Motorbike				
Car				

(2) Look at the table above and answer the following questions:

In the table, which family do you have traffic statistics? Read the transportation data of each family?; What is the total number of vehicles of the families in the group?; How many cars are there? How many motorbikes? How many bicycles?; Which family in the group has the most vehicles, has the fewest vehicles?

(3) Complete the following table by replacing each vehicle with a matching image according to the statistics of each group.

Table 2: Transportation of each family in group .....

.....'s family	
.....'s family	
.....'s family	
.....'s family	

(Hint: stick the prepared pictures that match the data)

Gia đình bạn A	

(4) Read to each other the following content: Table 2 of our group is called a picture chart.

(5) Observe the picture charts (of each group), read, write in a scrapbook, and present as much information as you can.

(6) Answer the following questions: What does your group's picture chart represent?; How many families are listed in the chart?; How many vehicles are there in each family?; Which family has the most vehicles, has the fewest vehicles? What is the total number of vehicles in your group?

(7) Circle the correct answers:

Picture charts outweigh the statistics table for:

1. The figures are visualized with images, colors of interest.
2. Reading data from graphs is more advantageous than reading statistics from the statistics table.
3. Picture charts display the data as well as some other characteristics of the objects represented (color, value, ...).
4. Picture charts display greater data than the statistics.

Step 4: Consider the feasibility of a practical effective teaching situations designed and adjusted (if needed).

To make specific and authentic assessments, it requires: small group tests, opinion of experts or experienced teachers.

2.3. APPLICATION OF DESIGNING EFFECTIVE TEACHING SITUATIONS IN ELEMENTARY SCHOOL MATH

From orienting design, applying design steps, similarly to the process of designing effective teaching situations with content “Diagram”, we carry out to design 11 effective teaching situations regarding to 3 forms of lesson (form new knowledge, practice and apply studied knowledge and practice Math extracurricular).

These effective teaching situations are considered as illustration for solutions in item 2.4, which helps teachers to be able to consult to design the same effective teaching situations. As well as, these effective teaching situations may be exploited to use in the process of teaching Math at Primary Education.

2.4. SOME SOLUTIONS HELP TEACHERS TO DESIGN AND USE APPLICATION OF DESIGNNG EFFECTIVE TEACHING SITUATIONS IN ELEMENTARY SCHOOL MATH

2.4.1. Orientation

Orientation 1: To help teachers to design and use effective teaching situations in elementary school math, from that implement effective teaching, contribute to implement concentrating education orientation and develop ability for pupils.

Orientation 2: Impact to the stitches of design process and use effective teaching situations.

Orientation 3: Impact to forms of lesson: form new knowledge, practice and apply knowledge (in and out class).

Orientation 4: Match with teachers' ability to teach Math at primary education, with pupils and practical teaching conditions.

2.4.2. Solutions cultivate teachers to design and use effective teaching situations in elementary school math

Based on the above four orientations, we find out 3 solutions to help teachers to design and use effective teaching situation with Math at primary education, therein each solution will be presented with structure:

Target and scientific basis of solution.

How to implement solution and example.

In each solution, we have illustration analysis to guide teachers to evaluate, self-evaluate design and use effective teaching situations in elementary school math**.**

***2.4.2.1. Solution 1: Cultivate for teacher knowledge and skills of designing and using* effective teaching situations in elementary school math**

a) Target and scientific basis of solution

The solution targets to cultivate for teacher knowledge and skills which are basis for designing effective teaching situation, including: knowledge and basic skills of math, education arguments and teaching Math at primary education; skills to research program, Math textbook at primary education; awareness of effective teaching situation and how to design effective teaching situation.

b) How to implement solution and example

- Carry out cultivating knowledge and basic skills for teachers in monograph seminars, activities at professional group about math, education argument and teaching Math at primary education.

Carry out training teachers in regular fostering monograph for developing Math programs at primary education.

- Guide teachers to evaluate results of studying Math at primary education towards focusing abilities of pupils.

- Guide teacher to carry out research Math textbook program at primary education.

- Cultivate for teacher about knowledges of effective teaching situation with Math at primary education and how to design.

2.4.2.2. Solution 2: Organize for teachers in practicing to design effective teaching situations in elementary school math education regularly

a) Target and scientific basis of solution

- Target: Organize teachers to practice skills to design effective teaching situations in elementary school math for purposes: form new knowledge, practice and apply studied knowledge and practice Math extracurricular.

- *Scientific basis:* Based on requirements and how to design effective teaching situation: Target and meaning of effective teaching situation; Basis, Rules of design; Four steps of designing effective teaching situation. Based on characteristics, teaching method of types of lesson.

b) How to implement solution and example

- Organize teachers to research, analyze some effective teaching situations, discuss to clarify applying argument for effective teaching situation, present design steps in a specific teaching content; give characteristics of effective teaching situation in each kind of lesson; notice in implementing each step.

- Organize for teachers to practice experiences for effective teaching situations in elementary school math education following steps with each kind of lesson, for purpose to help teachers to apply their knowledge about effective teaching situation to practice in designing effective teaching situations in elementary school math education.

2.4.2.3. Solution 3: Cultivate teachers for skills in practicing to use effective teaching situations in elementary school math education

a) Target and scientific basis of solution

- *Target:* This solution targets to guide teachers to how to use effective teaching situation which is designed in teaching Math at primary education, contribute to cultivate ability in implementing effective teaching of teacher.

- *Scientific basis: (i)* Effective teaching situation needs to be used matching with each learner; (ii) Effective teaching situation needs to be used in the right time; (iii) Using effective teaching situation has to guarantee promote the leading role of teachers.

b) How to implement solution and example

- Cultivate for teachers how to use effective teaching situations in elementary school math education

- Organize teachers to attend time to observe, compare to steps of using effective teaching situation, analyze to draw experiences with effective teaching situations in three kinds of lesson (form new knowledge, practice and apply studied knowledge and practice Math extracurricular)

- Guide teachers some notes when using effective teaching situations in elementary school math education

- Organize for elementary teachers to use effective teaching situations in elementary school math education designed with the above three kinds of lesson in professional group (Solution 1) and analyze to give experiences.

CONCLUSION OF CHAPTER 2

In chapter 2, we define four design steps for effective teaching situations in elementary school math education and apply to design 11 effective teaching situation which represent for three types of lesson with different knowledge topics in elementary Math.

To help elementary teachers to design and use effective teaching situations in elementary school math education, we have built three solutions for purpose: equip for teacher knowledge for effective teaching situation, how to design and use in teaching elementary Math; Organize to practice in designing and using

effective teaching situations in elementary school math education with 21 specific examples.

These solutions target to helps elementary teachers to develop ability of design and use effective teaching situation, develop abilities pupils need to have, meet requirements of Math education innovation at primary education nowadays.

Chapter 3
PEDAGOGIC EXPERIMENTATION

3.1. TARGETS AND TASKS OF EXPERIMENTATION

3.1.1. Targets

- To analysis possibility and performance of the process of designing effective teaching situations and evaluate impacts on teacher and students.

- To analysis possibility of measures supporting the teacher to design effective teaching situations in elementary school math.

3.1.2. Tasks

1) To design some effective teaching situations at elementary math, to examine the appreciation and reasonable of steps in designing effective teaching situations in elementary school math.

2) To executing some effective teaching situations designed, to evaluate possibility and to illustrate the performance of developing ability of primary student at Math.

3) To executing to help teachers to apply designing effective teaching situations process and to implement them.

4) To examine the change of designing capacity, teachers in implanting effective teaching situations and student's progress at Math, specially developing ability.

3.2. EXPERIMENTAL ARRANGEMENT

3.2.1. Content

(1) To experiment effective teaching situations designed.

(2) To design the effective teaching situations according to steps proposed

(3) To have measures to support teachers designing effective teaching situations in elementary school math.

3.2.2. Time

- Round 1: From early September,2015 to April,2016
- Round 2: From early September,2016 to late December,2016

3.2.3. Subjects

Pedagogic experimentation is implemented at 3 primary schools with grade 3 and grade 4: Dong Cuong, Dong Bac Ga, Nguyen Van Troi in Thanh Hoa city.

3.2.4. Experimental implementing process

3.2.4.1. Round 1

(i) The author sent effective teaching situations to primary teachers, authorities to retrieve comments and to edit; (ii) The author organizes the training courses for teachers in group having the related content; (iii) Teachers teach experimental lesson at classes; (iv) The author interviews the teachers and students after lessons to verify and learn some experience which is difficult to recognize through tests.

3.2.4.2. Round 2

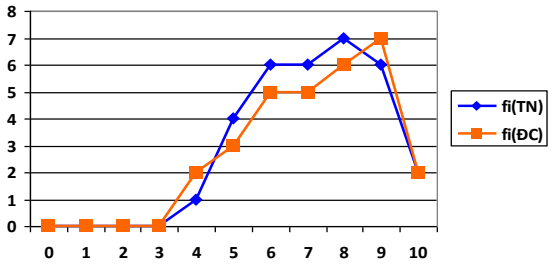
(i) To unify the designing steps edited and learn some experience from Round 1 again; (ii) The groups examine the design and implement effective teaching situations; (iii) The teachers teach pedagogic experimental lessons at classes; (iv) Evaluation of pedagogical experiment results

3.3. RESULT OF EXPERIMENTATION

Result of experimentation Round 1

When asking about 6 effective teaching situations, above 80% of teachers agreed in this idea and over 75% of teachers confirmed to its possibility. This show that the idea as well as the steps of designing effective teaching situations are appropriate, however, it is necessary to having needed edits to gain the higher possibility. We conduct to analyze, evaluate about qualitative result from pedagogic experimentation according to the result of evaluating the process, exchange directly and handouts, checks with teachers and students. The result shows that the quality of the students in experimental classes is always higher than that in other class.

Figure 3.6. The chart compares the results of test scores 1 of the experimental and control class of grade 4 of Nguyen Van Troi primary school



Result of experimentation Round 2

Teachers need to know clearly about the role of designing effective teaching situations in designing lessons process, have a through grasp of the steps in designing effective teaching situations. They also think that the steps proposed have to be appropriate and possibly apply in the fact. Apart from advantages gained from experimentation Round 1, experimentation Round 2 remedied some disadvantages from Round 1. After adjusting, we realize that the effective teaching situations edited are very nice. The result of the students in experimental classes is higher than that in other one. This shows that the steps in designing effective teaching situations in elementary school math is appropriate with teachers, content and the programs at elementary Math.

CONCLUSION OF CHAPTER 3

Chapter 3 represents the targets, tasks, content, methods and evaluation of pedagogic experimentation. This process is implemented according to 2 rounds at 3 schools in Thanh Hoa city, which is described in this thesis, having images and video to illustrate. Through the process of experimentation and analysis the result from them, we draw the conclusions: The steps in designing is appropriate, to have performance in the first time to improve teachers' ability in building the lessons and quality of teaching at elementary Math according to the spirit of developing the learners' ability; The effective teaching situations have the signs to become the effective teaching situations; The positive measures to teachers can help them be aware fully of effective teaching situations in elementary school math; Take form and develop ability of designing and using effective teaching situations.

CONCLUSION OF THE THESIS

In this thesis, approaching and solving the issue "Design of Effective mathematics Teaching Situations in Elementary Schools", we have mentioned the following research questions:

1) What’s the concept of effective teaching situations in teaching mathematics in elementary school?

2) How to design and use the effective teaching situations in mathematics in elementary school?

3) What're measures to help teachers design and use the effective teaching situations in mathematics in elementary school?

In order to develop the solution to the problem, we conduct theoretical and practical research and obtain the following results:

1. Clarification and systematization of relevant theoretical issues (clarifying some concepts as the theoretical basis for the solution of designing effective situations in mathematics in elementary school).

- Effective teaching: Effective teaching model, efficient teacher, effective teaching method, etc.

- Teaching situations; links with some types of situations in teaching;

- Effective teaching situations; relationship with education rennovation orientation

- Effective teaching situations in Mathematics in elementory school: Giving the concept, identifying three characteristics and four signs together with illustrative examples.

2. Investigating the teaching situation of Mathematics in Primary School from the design perspective and use of scenarios – based teaching according to the orientation of student capacity development:

- About the cognition and the teaching skills of Mathematics of the teacher.

- About the learning effectiveness of primary mathematics of the student.

Based on analyzing of the design activities, using the scenarios – based teaching of mathematics in primary school, we assess the current situation, consider the positive impact of the design of the effective scenarios – based teaching to the development of the teaching capacity of the teachers and the ability of self-studying, the capacity development of the students to meet the

requirements and orientations for the reform of mathematics education in high schools; and learning about the causes of limitations, design conditions, and the use of the effective scenarios – based teaching for the teachers and primary students.

3. Our thesis's solutions are presented as follows:

- Propose 4 directions and build 4 steps for designing scenarios-based teaching effectively in mathematics in primary school.

- Propose 3 measures to assist teachers in designing and using scenarios-based teaching effectively, including instructions, suggestions for implementation and detailed illustrations for teachers in the teaching of mathematics in primary school.

- Content selection, applying and designing of 11 scenarios-based teaching effectively at primary school, including three types of lessons: new knowledge formation, practice and application, and extra-curricular mathematics. These situations help the teacher to understand better the effective teaching, as well as help them similarly apply in other mathematics lessons at primary school.

The steps of designing scenarios-based teaching effectively, supporting measures as well as illustrative examples are considered as important contributions to the theory and practice of the thesis, which facilitate for the teachers at primary school to design, apply scenarios-based teaching effectively in mathematics at primary school, and enhance the effectiveness of mathematics teaching in practice, to contribute to the development of professional capacity.

4. Conducting two-round pedagogic experiments, initially confirming the appropriateness, rationality of designing steps, the feasibility of applying the designing scenarios-based teaching effectively in mathematics at primary school in practical teaching.

5. The results are obtained on the theory and practice, which confirms that the research task has been completed, the scientific hypothesis is acceptable, the thesis has reached the purpose.

THE LIST OF DISCLOSED SCIENTIFIC WORKS RELATED TO THE THESIS

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4. Do Hoang Mai (2016), *Some situation designs for ability development to solve problems of primary student throughout teaching mathematics*, Anniversary of the national scientific seminar "Training and fostering primary teachers to meet additional requirements of education in the context of international integration", Hue Pedagogical University, 5/2017, page172-179.
5. Do Hoang Mai (2017), *Retraining capacity to apply mathematics into reality for primary students through creative experimental activities*, Education Magazine, no401- the first term, 3/2017, page33-37.
6. Do Hoang Mai (2017), *Some methods to assist teachers to design the effective primary mathematics teaching situations contributes improvement of teaching quality*, Education Magazine, special no, 7/2017, page116-118.
7. Do Hoang Mai (2017), *Design and use of the effective mathematics teaching situations in primary school*, Education Magazine, special number, 7/2017, page113-115.
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