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FOSTERING THE COMPETENCY TO EXPLOIT MATHEMATICS CURRICULA FOR HIGH SCHOOL TEACHERS

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THE AUTHOR'S PUBLICATIONS
RELATED TO THE DISSERTATION TOPIC

1. Nguyen Danh Nam, Dang Cong Vinh (2017), Teacher training curriculum development: A profession-oriented approach, Proceedings of the International Conference on Teachers and Educational Administrators' Competence in the Context of Globalisation, Vietnam National University Press, pp.76 -85.
2. Dang Cong Vinh, Nguyen Danh Nam (2019), "Some orientations for the development of school educational programs", Education Magazine, October special issue, pp.21-23
3. Dang Cong Vinh (2019), "An experiment on developing classroom program through the design of thematic teaching of quadratic trinomial sign", Journal of Educational Management, No. 12; December 2019, page 93.
4. Dang Cong Vinh (2019), " Competence to develop school programs of math teachers in high schools", Proceedings of the scientific conference Developing school programs to meet the new educational program; Hanoi University of Education 2 Publishing House 2, 2019, page 181.
5. Dang Cong Vinh, Nguyen Danh Nam (2020), "Some measures to foster the competence of developing school program for high school teachers"; Journal of Educational Equipment, ISSN 1859-0810, No. 217, Issue 2, pp.50-52.

INTRODUCTION

1. Reason for choosing the topic

In recent years, the current renovation of the Mathematics general education curriculum from primary to high school marks a radical change compared to previous educational reforms. Accordingly, the new general education curriculum in Mathematics will be built in the direction of attaching importance to teaching people with literacy building, training and development in both quality and competency. At the same time, it must be student-centered, promoting students' initiative, positivity, creativity, and self-study competency.

In order to be able to fulfill the requirement of effectively exploiting the Mathematics general education curriculum, it is necessary to realize that the competency to exploit the curriculum is one of the core competencies in the pedagogical competency group of each teacher. This requires a change from the teacher training process in the pedagogical universities/colleges. Teachers must learn the methods and skills of analysis, assessment, adjustment and redesign of the national core-framework curriculum, the educational curricula of each subject, and must relate and collaborate with teachers of other subjects to be able to design a system of topics, learning projects, integrated disciplinary or interdisciplinary topics, and organize and control the implementation of appropriate learning activities to achieve the desired goals.

However, at present, in pedagogical universities/colleges, the scientific contents (theoretical and practical) of curriculum exploitation are still very new and have not been realized in the training curriculum clearly. The current training process has not really approached the professional competency development for future teachers, especially the competency to exploit the curriculum has not been mentioned. In addition, teachers currently teaching at high school have not been retrained to be able to actively research, design, expand and exploit the Mathematics general education curriculum systematically; instead, they still struggling to implement the policy of making the most of the curriculum in order to improve educational effectiveness and promote the continuous creativity of teachers. Especially the pressure and habit

of passively implementing a curriculum and a set of textbooks for too long created inertia among the teachers in the school. Because of the above reasons, the author of the thesis chose the topic: **"Fostering the competency to exploit Mathematics curricula for high school teachers"** as a research topic to serve practical activities, contributing to the fundamental and comprehensive renovation of Vietnam's education and training in general and the innovation of teaching methods of mathematics at high school in particular.

2. Research purpose

The research topic aims to clarify the theoretical framework of the competency to exploit Mathematics curricula and foster the competency to exploit Mathematics curricula for high school teachers, thereby proposing orientations, measures, methods, and ways to organize and conduct activities of building the competency to exploit Mathematics curricula for teachers in order to contribute to realizing the innovation of teaching methods and improving the quality of teaching Mathematics at high schools.

3. Research object

3.1. Research objects:

Competency to exploit Mathematics curricula of high school teachers.

3.2. Research subjects:

The process of fostering the competency to exploit Mathematics curricula for high school teachers.

3.3. Research scope

Based on the Mathematics general education curriculum at the high school level, the school's curriculum implementation time plan, the professional group's educational plan, teachers will develop educational plans for the school year, and accordingly organize teaching. Because the scope of the high school Mathematics curriculum is very wide, within the framework of the thesis, the author only focused on fostering the competency to exploit Mathematics curricula for high school teachers to transform the curriculum into effective and lively lesson plans in the direction of developing learners' competencies.

4. Scientific hypothesis

If measures to foster the competency to exploit the high school Mathematics curriculum for teachers are proposed and implemented, they will contribute to improving the quality of education, developing students' competencies to meet the requirements of fundamental and comprehensive innovation in education and training.

5. Research tasks

- Study the theoretical basis of curriculum, curriculum development the curriculum, the high school Mathematics curriculum and the competency to exploit Mathematics curricula of high school Math teachers.

- Investigate and evaluate the current situation of exploiting Mathematics curricula at high school.

- Propose measures to foster the competency to exploit Mathematics curricula for high school teachers.

- Guide teachers to design lesson plans and teaching activities oriented towards competency development for students and organization methods to teach those activities.

6. Research methods

6.1. Theoretical research methods

6.2. Methods of investigation, survey, observation

6.3. Pedagogical experiment

6.4. Interview and summarize experience:

6.5. Expert method

7. New contributions of the thesis

7.1. Theoretical contributions

- The thesis has summarized the system of theories about curriculum, high school math curriculum and the competency to exploit math curriculum of high school teachers. This will create a basis for further studies on curriculum in general and the competency to exploit high school curriculum in general.

- The thesis has identified the elements of the competency to exploit Mathematics curricula of high school teachers.

- The thesis has proposed the process of exploiting the high school math curriculum in the direction of developing students' competencies.

7.2. Practical contributions

- Proposed pedagogical measures to foster the competency to exploit Math curriculum for high school Math teachers.

- Designed a number of lesson plans, teaching activities oriented to develop students' competencies.

- Proposed a number of guidelines to help teachers design lesson plans, teaching activities and organize teaching in the direction of developing students' competencies.

8. Defensive arguments

- The components of the high school teachers' competency to exploit Mathematics curricula and the proposed fostering measures are scientifically based and feasible for teaching Mathematics.

- The process of exploiting high school math curriculum is scientifically based and feasible.

- High school teachers can rely on the instructions to exploit Mathematics curricula and teach Mathematics in the direction of developing students' competencies to meet the requirements of fundamental and comprehensive educational innovation.

9. The detailed structure of the thesis

In addition to the introduction, conclusion, recommendations, references and appendices, the thesis is structured into 3 chapters:

Chapter 1. Theoretical and practical basis

Chapter 2. Some measures to foster the competency to exploit Mathematics curricula for high school teachers.

Chapter 3. Pedagogical Experiment

Chapter 1
THEORETICAL AND PRACTICAL BASIS

1.1. Basic concepts

1.1.1. Curriculum

1.1.1.1. The concept of curriculum

A curriculum is a combination of experiences and activities organized in a certain pedagogical environment in order to form and develop intellectual, moral, aesthetic, physical and labor competencies for students. It shows the educational goals that students need to

achieve in a specified period of time, and clearly defines the teaching content, methods, forms of teaching organization, and forms of assessment of learning outcomes as well as the conditions to achieve the set educational goals.

1.1.1.2. Classification of general education curricula

There are many ways to classify curricula, but people usually choose the following two ways

Classification Method 1: Content-based curricula and competency-based curricula [59].

a. Content-based curricula

This approach stems from the concept that education is the process of imparting knowledge that everyone needs and can know. Accordingly, the educational curriculum is an outline of educational contents, so the development of the curricula begins with the selection of subjects and the specific content of each subject. The main educational objective is the content of knowledge of each subject that teachers must teach and students must comprehend; Accordingly, the curriculum's output standards mainly include knowledge content criteria.

According to this approach, the curricula is described as a content system according to the logic of the subjects, the logic of the content units of a subject, between levels and between grades; Curricula of this type often emphasize remembering and reproducing knowledge in teaching, learning, testing and assessing learning outcomes.

b. Competency-based curricula

Competency is understood as an organized combination of knowledge, skills with attitudes, feelings, values, and personal motivations in order to effectively meet the complex requirements of certain contextual activities.

Develop the competency to pay attention to the logic and structure of the qualities and competencies that make up the student's personality. Accordingly, active education and teaching on intra-subject, and interdisciplinary topics is identified as the dominant method when designing goals, curriculum output standards, and selecting subject contents, educational activities, methods of teaching, testing and assessment.

The following is a comparison table of some basic characteristics of a content- based curriculum and a competency-based curriculum:

Table 1.1. A comparison of the content-based curriculum and the competency-based curriculum

Curriculum Features	Content-based curriculum	Competency-based curriculum
Curriculum model		
Key points	* Content-based	* Apply knowledge to life
Type of activities	* From one person to another	* Learners and teachers cooperate
Type of learning	* Mainly acquiring knowledge and cognitive skills. * Emphasize cognitive skills and logical thinking. * Each knowledge and skill is learned intermittently, with little repetition and separetly in each subject	* Apply knowledge, skills and attitudes in an integrated fashion in real contexts to gradually develop competencies. * Emphasize cognitive skills, critical thinking, communication skills, cooperation skills. * Each competency is developed continuously in a spiral in many areas/subjects along time.
Responsibility	* Mainly responsible for providing support resources	* Responsible for providing resources and for the end result.
Curriculum Elements		
Goals/Outputs	* Requirements for specific knowledge, skills, and attitudes	* Level of competency development (a combination of knowledge, skills, attitudes, feelings, motivations and emotions).
	* Determined on the basis of subject content requirements. * Expectations for learners.	* Developed on the basis of the needs of work in society. * Expectations for both learners and teachers.

Curriculum Features	Content-based curriculum	Competency-based curriculum
Learning content	* Select the necessary knowledge from the science of the subject. * The content organization is mainly according to the subject's scientific logic.	* Choose the necessary competencies for students in life. * Organize content primarily in an integrated way that helps shape and develop competencies.
Methods of teaching and learning	* Derived from experience in the process of scientific research of the subject. * Pay attention to the learning organization of the content in the curriculum. * Adapt to the experience of the whole class when studying each subject.	* Derived from the experience of engaging with real life. * Through experience, pay attention to the organization developing the potential inherent in each person. * Adapt to each person's experience in learning and life.
Assessment of learners	* Emphasize the knowledge and skills that have been specified. * Focus on summative assessment.	* Emphasize real outputs in each student. * Focus on formative assessment (monitoring progress) and summative assessment.
	* Measure single subjects. * Mainly done by teachers. * Usually collects information at fixed times.	* Focus on measuring many competencies in the process of students participating in real activities; * Done by teachers and students. * Information is collected during the process (Profile, project, ...)

(Nguyen Thi Lan Phuong et al.)

Classification Method 2: According to curriculum management level

According to the level of management scope, it is possible to classify curricula by level: national educational curricula, local education curricula, school educational curricula.

a. National educational curricula

The national curriculum is the "Basic Design Map of Education" which serves as the basis for formulating and implementing policies and examination regimes for graduation, development of learning materials, textbooks, and educational equipment, training and retraining of teachers and administrators, building financial and administrative mechanisms in the education system.

b. Local educational curricula (province or city level)

A local curriculum is a curriculum implemented or supplemented on the basis of a national curriculum developed and directed by the local (for example, at the Provincial/City level) to ensure the implementation of the national curriculum and other guiding documents, in line with local educational reality.

c. School educational curricula (departments, teachers)

If the national educational curriculum is a general design with a general legal nature that prescribes the criteria and specifications of the outputs of the training process that all schools and teachers in the country can use, then the school educational curriculum is the concretization of that general design to suit the specific characteristics of each school so that all students at school can and must meet the common standards.

Based on the national curriculum and their specific conditions, the school directs the professional groups to develop the education plan for the professional group, including the subject teaching plan (curriculum distribution) and the plan to organize educational activities in the spirit of keeping or partially adjusting, selecting and rearranging, or redesign with the participation of teachers and experts to ensure the implementation of the national curriculum and other guiding documents, in accordance with local and school educational practices.

Based on the subject teaching plan of the professional group, each teacher is allowed to build his own rich and diverse educational plan, and then develop lesson plans and directly implement them in teaching to ensure consistency and suitability with the requirements of the school education plan. This is the key step that determines the quality of education.

As there are many contents in the curriculum, within the framework of the thesis, we only focus on researching issues related to the process of exploiting the national Mathematics curriculum to develop competency-based lesson plans, meeting the requirements of educational innovation.

1.1.2. Competency

1.1.2.1. The concept of competency

Exploiting the competency-based Mathematics curriculum needs to start from understanding the concept of competency. There are many different definitions of the concept of competency, but there is no universally accepted definition. However, based on some domestic and foreign documents, we analyze some definitions of competency of foreign and domestic authors.

Competency is a combination of psychological attributes of an individual, formed and developed in a specific field of activity; is the potential human power in solving practical problems. The concept of competency used in our thesis is understood as performance competency, which is the mastery of knowledge, skills, attitudes and personality traits that a person needs to meet the requirements of a specific task; in other words, students need to know-how, not just know-what.

1.1.2.2. Structure of competency

a. Approach the structure of competency according to the combined resources

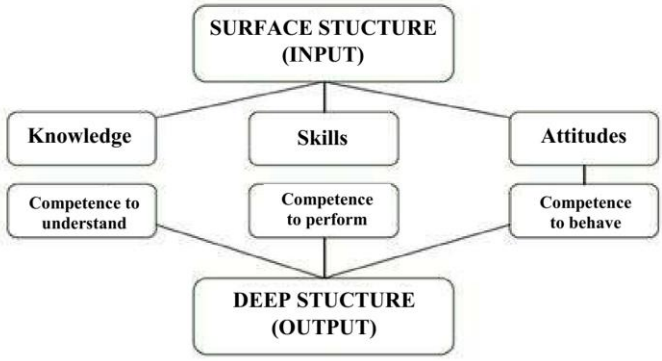

Figure 1.1: Structure of competency according to the combined resources

b. Approaching the structure of competency according to components of competency

Different from the above documents, Nguyen Lan Phuong does not agree that a competency structure includes knowledge, skills, attitudes... but she argues it includes the following three main components: Components of competency are the fields of expertise that creates competency; Elements are the partial competencies or skills that make up each component of competency; Behavior is the part that is separated from each element. [60]

Thus, it can be seen that, at the input (surface structure) stage, competency is made up of knowledge, skills and attitudes. At the output (depth structure) stage, those components become the competency to understand, the competency to perform and the competency to behave. Each competency corresponds to a type of activity, which can be divided into many components of competency; The smallest component, associated with a specific activity, is a skill (behavior). Partial competencies can be at the same level, complement each other, but can also be at different levels of development [10].

1.3. Mathematics general educational curriculum

1.3.1. Mathematics education plan

The Mathematics Education Plan is a plan to implement all activities of the professional group in a school year, which is developed by the

professional group in order to specify the contents and methods of implementing the national Mathematics curriculum in accordance with local practice on the basis of ensuring the general requirements of the national curriculum. Therefore, there is no common math education plan for all schools within a province or the whole country.

1.3.2. Thematic teaching plan, Math lesson plan

A thematic teaching plans and a Math lesson plans is a projected scenario designed by a math teacher, including all the work of teachers and students for a topic/lesson in order to help learners meet the requirements of qualities and competencies corresponding to the subject/lesson specified in the subject curriculum. [5]

Thus, a thematic teaching plan and a math lesson plan is the classroom scenario of each teacher with a specific group of students and a specific content (a topic, a lesson) in a specific space and time as well as the selection of teaching methods, means and forms of examination and assessment in accordance with the requirements of the respective competencies and qualities in the subject curriculum.

The clear presentation of a number of concepts and issues related to the design of thematic teaching plans and Mathematics lesson plans is necessary, contributing to helping teachers understand a number of practical issues to deploy curriculum development with better quality.

1.4. Exploit the curriculum

1.4.1. The concept of exploiting the high school Mathematics curriculum

According to the author, exploiting the high school Mathematics curriculum is the process in which high school Math teachers concretize Mathematics curricula, making the national educational curriculum suitable with the reality of the educational institution to the greatest extent. On the basis of ensuring the general requirements of the national educational curricula, teachers will select contents, develop lesson plans, design questions, exercises, and tests and determine appropriate implementation methods in accordance with classroom practice to meet the requirements of helping students develop their own competencies, apply knowledge to life, and effectively implement educational goals. At the same time, they can learn from experience after each lesson, set new goals, tasks, and implement methods to overcome shortcomings after each lesson [12].

1.4.2. Subjects of curriculum exploitation activities

Level	Subjects of curriculum development	Subjects of curriculum exploitation
National	Ministry of Education and Training; Professional agencies; scientists, teachers, etc.	Department of Education and Training Schools, Subject teachers
Local	Department of Education and Training	Schools, Subject teachers
School	Schools, Scientific Councils, groups of subject teachers	Subject teachers

1.5. The process of developing school curriculum

Because the school curriculum is a type of educational curriculum, the development of the school curriculum also has characteristics, content and conforms to the general process of educational curriculum development. The school curriculum development is considered as an process integrated in the education and training process. According to Prof. Nguyen Duc Chinh, this process consists of 5 steps [17]

- Analyze the situation/need
- Define goals and objectives
- Design curriculum
- Implement curriculum
- Evaluate curriculum

This is a continuous and closed process described in the diagram below:

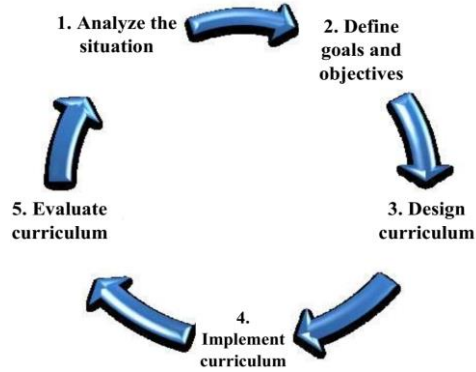

Figure 1.5: The process of developing school curriculum

1.6. Propose the process of exploiting Mathematics curricula for high school teachers in the direction of developing students' competencies

After studying and synthesizing models and processes of curriculum development, it can be seen that the models and processes have adequate steps to help schools, professional groups, and teachers build a good math school curriculum, which is called the Mathematics plan of the professional group. However, there is still no specific process to help high school teachers make the most of the national curriculum and teaching plan for a subject in general and Mathematics in particular. Especially, it is very difficult to transform the Math curriculum and teaching plan of the professional group into lesson plans oriented to develop learners' competencies. Therefore, when applying it to transform the national curriculum into vivid lesson plans and develop students' qualities and competencies, high school math teachers are sometimes confused.

Therefore, in this study, the author would like to propose a process of exploiting the high school Mathematics curriculum in the direction of developing students' competencies, including 5 steps:

Step 1: Study the educational curriculum, the teaching plan of the professional group and the Math textbook

Step 2: Exploit the curriculum's goals to determine the lesson objectives and the competencies that students need to achieve

Step 3: Design the thematic teaching plan, Math lesson plan in the direction of developing students' competencies

Step 4: Implement the teaching experiment with the Math lesson plan

Step 5: Test, evaluate and adjust the thematic teaching plan and lesson plan

1.7. High school teachers' competency to exploit Mathematics curricula

1.7.1. The concept of high school teachers' competency to exploit Mathematics curricula

On the basis of theoretical research on the curriculum, exploitation of the curriculum, especially the process of exploiting Mathematics curricula presented in the previous sections, we have proposed that the

competency to exploit the Mathematics educational curricula of high school teachers is the competency to skillfully combine knowledge, skills, and attitudes to select content, develop lesson plans and determine how to implement them in accordance with classroom reality in order to concretize national curriculum, local curriculum, school curriculum, meeting the requirements of developing students' competencies, effectively implementing the goals of general education.

1.7.2. Elements of high school teachers' competency to exploit Mathematics curricula

On the one hand, exploiting educational curricula implements curriculum innovation; on the other hand, it forms and develops the teachers' competency to exploit curricula. Thus, the competency to exploit the curriculum has been developed for teachers in the process of their participation in the development and exploitation of the curriculum.

The process of teachers participating in different stages of exploiting the educational curriculum is the process in which teachers are trained, to improve their competency to exploit the curriculum, and at the same time contribute to the development and completion of the teaching plan of the professional group and the teacher's lesson plan/topic lesson plan. Based on the steps in the process of exploiting Mathematics curricula for high school teachers in the direction of developing students' competencies, the author has proposed the following groups of competencies to exploit Mathematics curricula of high school teachers including as follows

Table 1.3. Structure of the competency to exploit Mathematics curricula of high school teachers

Groups of competencies	Elements of the competency
Competency to study educational curricula, teaching plans of professional groups and textbooks of Mathematics	Skills to study educational curricula of Mathematics, teaching plans of professional groups
	Skills to study Mathematics textbooks
Competency to exploit curriculum objectives to determine lesson objectives and competencies that learners	Skills to exploit curriculum objectives to determine lesson objectives and competencies that learners need to acquire
	Skills to identify activity objectives corresponding to each content unit of knowledge

Groups of competencies	Elements of the competency
need to acquire	Skills to investigate students' existing knowledge
Competency to design Mathematics lesson plans in the direction of developing students' competencies	Skills to review and evaluate curricula, textbooks and their suitability to learners' competencies, level, and learning needs
	Skills to select, arrange and supplement teaching contents in textbooks and other sources
	Skills to identify, select, and coordinate appropriate teaching methods
	Skills to design teaching topics, lesson plans oriented towards developing students' competencies
Competency to implement teaching with Mathematics lesson plans	Skills to organize teaching methods suitable for students
	Skills to use teaching methods, means and tools rationally and flexibly
	Skills to apply information technology in teaching
	Skills to manage classroom, detect and handle situations in the teaching process effectively
Competency to test, evaluate and adjust lesson plans	Skills to develop assessment plans for teaching topics and lesson plans
	Skills to organize testing activities to assess students' learning outcomes.
	Skills to adjust lesson plans.

1.8. The current status of exploiting Mathematics curricula and the competency to exploit Mathematics curricula of high school teachers

CONCLUSION FOR CHAPTER 1

In Chapter 1, the thesis has studied the theoretical basis, synthesized and analyzed the concepts of the curriculum, curriculum development, Mathematics educational curricula, Mathematics educational curricula exploitation and the concept of competency. Based on these theories, the author has proposed the process of exploiting the mathematics educational curricula at high school and the elements of the competency

to exploit the mathematics educational curricula of high school teachers. Accordingly, the process of exploiting Mathematics curricula at high schools includes 5 steps:

Step 1: Find out about the educational curriculum, the teaching plan of the professional group and the Math textbook

Step 2: Determine the lesson objectives, the competencies that students need to achieve

Step 3: Design thematic teaching plans, Math lesson plans in the direction of developing students' competencies

Step 4: Implement the teaching experiment with the Math lesson plans

Step 5: Organize the assessment and adjustment of the thematic teaching plans and lesson plans

In addition, the competency to exploit Mathematics curricula of high school teachers consists of 5 elements: Competency to study educational curricula, teaching plans of professional groups and math textbooks; Competency to identify lesson objectives and the competencies that students need to achieve; Competency to design lesson plans for Math lessons in the direction of developing students' competencies; Competency to implement teaching with Maths lesson plans; Competency to test and evaluate students' learning outcomes and adjust lesson plans.

Moreover, the results of the survey on the current status show that the majority of high school math teachers in the survey area are fully aware of the necessity of effectively exploiting Mathematics curricula. However, the understanding of the content and methods of implementation is still limited; the teachers' competency to exploit Mathematics curricula in practice is very weak; and the teachers all confirm that it is very necessary to train high school math teachers on the competency to exploit Mathematics curricula. Stemming from the above situation, we realize that it is necessary to prove solutions to improve the competency to exploit Mathematics curricula for high school Math teachers, contributing to the renovation of general education in the current context.

Chapter 2
SOME MEASURES TO FOSTER THE COMPETENCY TO EXPLOIT MATHEMATICS CURRICULA FOR HIGH TEACHERS

2.1. Orientations to build measures

The purpose of the measures is to help high school math teachers improve their competency to effectively exploit Mathematics curricula. Therefore, this is the first criterion to propose measures to effectively teach and develop students' competencies.

Orientation 1: In order to help teachers design thematic teaching plans, lesson plans suitable for the students, thereby implementing effective teaching, contributing to the implementation of the educational orientation of focusing on developing students' competencies.

Orientation 2: Impact on the stages of the process of exploiting Mathematics curricula. In order to effectively exploit Mathematics curricula, teachers need to go through 5 steps: Study the educational curriculum, the teaching plan of the professional group and the Math textbook; Exploit curriculum objectives to determine lesson objectives and the competencies that students need to achieve; Design lesson plans for Math lessons in the direction of developing learners' competencies; Implement teaching with Math lesson plans; Check and evaluate students' learning results and adjust lesson plans. Therefore, measures should be taken to ensure that teachers can fully implement this process.

Orientation 3: The process of exploiting Mathematics curricula and the measures to foster the competency to exploit Mathematics curricula of high school teachers must be feasible and effective, ensuring that it can be tested through the pedagogical experiment.

The comparison of results when acting on control and experimental groups is an important basis in confirming the feasibility of the proposed measures. Therefore, in order to check the feasibility of the proposed measures, it is necessary to pay attention to the pedagogical experiment and the organization of training for teachers to master the basic knowledge, the process of exploiting Mathematics curricula and how to implement curriculum exploitation.

Orientation 4: Measures must be consistent with theory and practice, ensuring the requirement of reforming general education.

Therefore, when developing measures to help high school Math teachers improve their competency to exploit Mathematics curricula, it is necessary to stick to the requirement of general education innovation to form students' competencies. In particular, it is necessary to strengthen the connection with practical problems, focus on skills training through learning activities, especially group activities, uphold a positive self-discipline in learning and applying knowledge in solving practical problems.

2.2. Some measures to foster the competency to exploit Mathematics curricula for high school teachers

2.2.1. Measure 1: Fostering knowledge about exploiting Mathematics curricula and the competency to exploit Mathematics curricula for high school teachers

2.2.2. Measure 2: Organize for high school math teachers to practice designing teaching topics and lesson plans in the direction of developing students' competencies

Based on the process of exploiting Mathematics curricula in the orientation of innovating the design of teaching topics and lesson plans introduced in Chapter I, we focus on: Study educational curricula, teaching plans of professional groups and math textbooks; Determine the lesson objectives and the competencies that students need to achieve; Design lesson plans for Math lessons in the direction of developing students' competencies. In order to design a teaching topic and an effective developing students' competencies-oriented training plan, it is necessary to guide teachers to experience the following activities:

Activity 1: Find out about the educational curriculum, the teaching plan of the professional group and the Math textbook. Accordingly, determine the lesson objectives, the the competencies that students need to achieve after the lesson.

Activity 2: Design teaching topics and lesson plans in the direction of developing learners' competencies

2.2.3. Measure 3: Guide teachers to organize teaching in the direction of developing students' competencies

a. Guide teachers to identify requirements for innovating teaching methods in the direction of developing learners' competencies

b. Guide teachers to choose appropriate teaching methods and teaching forms

c. Guide teachers to choose and use teaching aids and technologies

d. Guide teachers to organize teaching in the direction of developing learners' competencies

Guide teachers to organize teaching activities according to the following steps:

Step 1: Help students express their original ideas

2.2.4. Measure 4: Organize for teachers to test and assess students' learning results to adjust and complete teaching topics and lesson plans

a. Organize for teachers to observe lessons and compare with the steps of organizing and implementing the curriculum mentioned above to learn from experience and adjust.

b. Organize for teachers to check and evaluate students' learning results

c. Guide teachers to use and design forms to evaluate the feasibility of teaching topics and newly designed lesson plans

CONCLUSION FOR CHAPTER 2

In chapter 2, the author has proposed orientations and measures to foster the competency to exploit Mathematics curricula for high school teachers to help teachers concretize Mathematics curricula into teaching topics and lesson plans oriented to develop learners' competencies. Measures include: Foster high school teachers' knowledge about exploiting Mathematics curricula; Organize for high school math teachers to practice designing teaching topics and lesson plans in the direction of developing students' competencies; Guide teachers to organize teaching in the orientation of developing students' competencies; Organize for teachers to check students' learning results, evaluate, adjust and complete teaching topics and lesson plans

These measures would help teachers raise their awareness about the importance of exploiting Mathematics curricula in the current period. At the same time, through experiential activities of designing teaching topics and lesson plans oriented towards developing students' competencies, teachers would improve their competency to exploit Mathematics curricula. Through the testing, evaluation and self-assessment of the results of designing and teaching teaching topics to develop students' competencies, teachers could check the feasibility of the process of exploiting Mathematics curricula, thereby adjusting, supplementing and perfecting the designed teaching topics.

Chapter 3
PEDAGOGICAL EXPERIENCE

3.1. Purposes and tasks of pedagogical experiment

3.1.1. Purposes of the pedagogical experiment

- The pedagogical experiment was conducted to test the feasibility and effectiveness of the proposed process of exploiting Mathematics curricula and the competency to exploit Mathematics curricula of high school math teachers.

- Test the feasibility of measures to foster the competency to exploit Mathematics curricula for high school math teachers and the correctness of the scientific hypothesis.

3.1.2. Tasks of the pedagogical experiment

Compile documents for the pedagogical experiment; conduct training for teachers to exploit Mathematics curricula through designing teaching topics, lesson plans and organize experimental teaching according to some pedagogical measures proposed in chapter 3.

Assess the change in teachers' competency to design and implement teaching topics, lesson plans, and the development of students' competencies.

Collect and process the results of training and experimental teaching to check the feasibility and effectiveness of the proposed measures.

3.2. Organization of the pedagogical experiment

3.2.1. Subjects of the pedagogical experiment

* Teachers:

In the process of the research, the pedagogical experiment was conducted in 3 Mathematics groups of Le Hong Phong High School - Bien Hoa - Dong Nai Province, Thai Phien High School - Thanh Khe - Da Nang City and Xuan Giang High School - Soc Son District – Hanoi City. In each research group, there are 6 teachers selected to teach the experimental and control classes.

3.2.2. Contents of the pedagogical experiment

Phase 1 (Including 3 times of teacher training).

The researcher organized training and discussion with 3 research groups including 61 math teachers from 3 high schools above according to training documents compiled based on basic concepts presented in chapters 1 and 3 of the thesis to ask them for comments, evaluate the proposed measures, then make appropriate adjustments.

At the end of each training session, the author organized 3 groups of teachers to propose and design a similar lesson plan. (See Appendix)

Phase 2 (Including 2 times of experimental teaching).

First time: Organize for some teachers (who have been trained in the first phase) to participate in teaching and observe experimental teaching on the topic of *functions* proposed in the training document. This experiment is to ask for feedback from teachers, evaluate the feasibility of the process of exploiting Mathematics curricula, learn from the shortcomings and make adjustments.

Second time: Organized for teachers to teach experimental lesson plans that have been designed by research groups and the compared with control group to evaluate the feasibility and effectiveness of the measures proposed in chapter 3. Each experiment class corresponds to a control class with the same number of students and learning competency (based on the results of previous tests administered by Math teacher of that class). In the control class, the teacher teaches the above subject according to the regular lesson plan.

The teaching process includes both polling and testing. Assess student's learning results; Analyze and compare the results of the experimental class with the control class.

3.2.3. Pedagogical experiment time

Phase 1: Teacher training from June 2018 to July 2018; divided into 3 stages

- Stage 1: 2 days 18-19/6/2018. Participants: 21 Math teachers at Thai Phien High School - Thanh Khe District – Danang City.

- Stage 2: 2 days 2-3/7/2018. Participants: 21 Math teachers at Le Hong Phong High School – Bien Hoa City - Dong Nai Province.

- Stage 3: 17-19/7/2018. Participants: 19 Math teachers at Xuan Giang High School - Soc Son District - Hanoi City.

Phase 2: Experimental teaching from October 2018 to April 2019 at schools.

3.2.4. Pedagogical experimental process

3.3. Lesson plans for the pedagogical experiment

3.4. Results of the pedagogical experiment

3.4.1. Results of pedagogical experiment phase 1

3.4.2. Results of pedagogical experiment phase 2

3.4.3. Investigate the impact of the proposed measures on the competency to exploit Mathematics curricula of high school teachers

CONCLUSION FOR CHAPTER 3

After meeting and discussing the measures proposed in chapter 3 of the thesis with 61 math teachers of six math groups in 3 high schools to ask for comments and evaluation for the proposed measures, we have collected the following information: The results were relatively positive. Most of the teachers interviewed thought that the proposed measures were new to them and were feasible and effective. Based on those measures, all teachers proposed to design one to three new teaching topics and lesson plans. This result allows us to conclude that the steps in the process of exploiting Mathematics curricula and measures to foster the competency to exploit Mathematics curricula for Math teachers at high school is appropriate and initially effective, contributing to improving the quality of mathematics teaching at high school in the direction of developing learners' competencies.

We conducted experimental teaching twice (with control) at three high schools, belonging to different regions. The results of the

pedagogical experiment show that students in the pedagogical experiment class were more interested in learning; they understood the lesson better and their competency to apply knowledge to solve practical problems was better. The pedagogical experimental lesson plans created an exciting classroom atmosphere because students were more excited to learn, think and discuss; The pedagogical experimental lesson plans have a clear teaching progress, so they are feasible. The learning results of the experimental classes were higher than that of the control classes, and the students of the experimental classes showed more stability and depth of knowledge than the control class. The results of the survey on the knowledge and competency to exploit Mathematics curricula of the teachers after the training were much higher than before the experiment. These results show that the proposed training measures and plans are effective. The results of the pedagogical experiment have proved the feasibility and effectiveness of the measures to foster the competency to exploit Mathematics curricula for high school Math teachers proposed in Chapter 2; The scientific hypothesis in the thesis is acceptable.

CONCLUSION OF THE THESIS

1. The thesis has contributed to supplementing and developing the theoretical basis of the problem of exploiting Mathematics curricula at high schools in the direction of developing students' competencies such as building a system of concepts related to curriculum, exploiting the curriculum, competency and especially proposing the process of exploiting Mathematics curricula and the elements of the competency to exploit Mathematics curricula in the direction of developing students' competencies.

2. The thesis has surveyed and analyzed comprehensively the current situation of the problem of exploiting Mathematics curricula and the competency to exploit Mathematics curricula of high school math teachers. On that basis, the thesis has specified the strengths, weaknesses and causes of those strengths and weaknesses, which can serve as a practical basis to propose measures to foster the competency to exploit Mathematics curricula high school math teacher in chapter 2.

3. On the basis of theoretical and practical research, the thesis has proposed measures to foster the competency to exploit Mathematics curricula for high school teachers, including instructions, suggestions for implementation and explanation, and specific illustrations for teachers to deploy in the process of exploiting Mathematics curricula. All of these can help high school math teachers concretize Mathematics curricula into topics, lesson plans oriented towards developing students' competencies, contributing to the renovation of general education, in line with the requirements of fundamental and comprehensive renovation of Vietnamese education in the current period.

The steps in the process of exploiting Mathematics curricula, the support measures along with the topics, and the illustrative training plan are considered important contributions to the theory and practice of the thesis, creating favorable conditions for high school teachers to practice exploiting the mathematics curricula at high school, in order to enhance the effectiveness of math teaching in practice, and contribute to the development of professional competency.

4. We have conducted two-round pedagogical experiment, initially affirming the suitability and rationality of the steps to exploit Mathematics curricula in the direction of developing students' competencies.

5. The results obtained in theory and practice confirm that the research tasks have been completed, the scientific hypothesis is acceptable, and the thesis has achieved its purposes.