MINISTRY OF EDUCATION AND TRAINING
VIETNAM INSTITUTE OF EDUCATIONAL SCIENCES

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DEVELOPMENT OF E-LEARNING COURSE-WARE FOR CAPACITY BUILDING OF PRIMARY TEACHERS

Major: Theory and History of Education

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SUMMARY OF THE DOCTORAL DISSERTATION ON EDUCATIONAL SCIENCES

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INTRODUCTION

1. Reasons for the research

In the current period, training and fostering for primary teachers in response to the program renewal and new textbook is a critical requirement. Each primary teacher has to regularly self-study and self-foster in order to improve and meet the requirements of the innovation of primary education.

Research on the development of E-learning materials for self-study and self-fostering of teachers in general and primary teachers in particular is the inevitable trend in this era.

However, E-learning resources are different from traditional learning resources in many aspects. The main difference is that it becomes the object of interest and should be studied in order to develop E-learning materials effectively. A scientific concept of E-learning materials which is organized and developed to satisfy the requirement of self-study and capacity building of the primary teachers in our country can be a research project answering the following questions:

1. How is E-learning materials for primary teachers designed to promote the pedagogical efficiency and power of ICT and encourage teachers to study and build their capacity?
2. How does E-learning materials in primary teachers' self-fostering and self-study impacts on the learning environment, school performance, and teaching as well as other aspects of primary education?

For hereinabove reasons and contexts, we choose the research topic "Development of E-Learning Course-Ware for Capacity Building of Primary Teachers" for the doctoral dissertation on Educational science.

2. Objectives: clarify the scientific concept of E-learning materials for primary teachers and build an E-learning materials system to meet the primary teachers' needs of self-study and capacity building.

3. Research population and object

- Research population: Primary teachers' self-study and self-fostering.

- Research object: E-learning materials and its relation with academic and training activities of primary teachers.

4. Scientific hypothesis

Development and use of e-learning course is one of the effective organization of teaching to develop the primary teachers' expertise. If E-learning materials is designed and integrated with the network services along with facilities suitable to the characteristics and needs of primary teachers' professional development, it will attract teachers and support the teachers' self-learning and capacity building.

5. Research tasks and scope

5.1. Research tasks

Because of limited time and capacity, the dissertation focuses on the following topics:

- Identify the rationale and practical basis of E-learning materials to meet the needs and professional characteristics of the primary teachers.

- Design E-learning materials and e-learning system to support the primary teachers' professional development based on network communication technology.

- Test E-learning materials with selected modules of primary teachers' training materials.

5.2. Scope of research

     - Focus on arguments and design E-learning materials through some modules of primary teachers' training materials.

     - Conduct survey and evaluation of the practical status of regular training need and application of ICT to teaching and learning.

     - Design and develop E-learning materials system and post 3 experimental courses online for teachers to use and then evaluate the instructional materials, pedagogical impact and feasibility of the instructional materials.

6. Research method: Theoretical research; Survey method; Expert method; Experience summation method; Case study method; Pedagogical Experimental Methods; Descriptive statistics method

7. Arguments

   - Development and use of e-learning course is one of the effective teaching organization ways to develop the primary teachers' expertise

   - Design of E-learning materials must satisfy the needs of primary teachers' self-study and professional development as well as be suitable to the characteristics of primary teachers.

   - Application of E-learning materials to training and professional development has positive impact on exploitation and application of ICT to teaching activities.

8. New contribution of the dissertation

   - In theory: Clarify the concepts of learning materials, e-learning instructional materials, teachers' professional development; the relationship between e-learning and learning theories; occupational characteristics and professional development of primary teachers; the role of information and communication technology (ICT) and E-learning materials in supporting primary teachers' self-study and capacity building.

   - Propose the principles and processes of designing and developing E-learning materials fit the learning characteristics and meeting the requirements of primary teachers' self-study and professional development.

   - The dissertation can assess the practical demand, exploitation and use of information and communications technology in primary teachers' teaching and learning. Based on that, E-learning materials is designed for primary teachers' professional development.

   - Development and application of E-learning materials proposed by the dissertation has a positive impact on teaching and training activities as well as other activities of primary teachers.

9. The dissertation structure

     In addition to Introduction, conclusion, reference, research annexes, the dissertation includes 3 chapters

CHAPTER 1. THEORY AND PRACTICE OF DEVELOPMENT OF E-LEARNING MATERIALS FOR PRIMARY TEACHERS

1.1. Literature review

1.1.1. Worldwide researches

     In the world, researches on E-learning and E-learning applications in education and training have been conducted since the 1990s. Initially, E-learning was strongly researched and developed in North America, Europe, then in Asian countries, especially in South Korea. In late 20th century, education and training inherited from the achievements of ICT, many studies of teaching and training software based on web technology, training online were implemented.

E-learning studies in teachers' training and fostering have also been developed by a number of countries in Europe such as IT training system for teachers of the Republic of Cyprus; ePortfolio system for teachers of Estonia; fostering model for teachers KenGure of Finland; Learning Networks of Norway; researches on building E-learning systems for training and fostering teachers in Portugal.

The studies have confirmed the advantages of E-learning in training and fostering teachers, especially application of b-learning; The training programs through e-learning are really attractive and attract teachers to participate in learning when learning materials, training content suit the needs and characteristics of teachers' professional activities and teaching environment.

Most of the training courses initially aim at equipping teachers with the knowledge and basic skill of IT, then teachers can use knowledge and skills learned as a learning tool for other contents through E-learning system. Teachers can gain new knowledge and skill through work, illustrations and immediately apply such knowledge to teaching.

- Learning in the E-learning environment, interaction with materials, interaction between learners and learners attract teachers more. They feel excited when discussing and making friends through forums.

- For a successful training program, it needs the involvement of many agencies: State management agencies, research institutes, teacher training institutions and schools. In particular, research institutes and teacher training institutions are primarily responsible for the expertise, design and development of learning content; State management agencies will be responsible for managing the training process, creating mechanisms to encourage teacher to participate such as assessment and awarding the certificates.

1.1.2. Domestic researches

In Vietnam, the training facilities conduct researches and develop E-learning system to support remote training program and focus on high schools and universities. Researches on application of E- learning for teacher training, especially primary teachers are very limited. Currently, there are no studies assessing the need for e-learning instructional materials, the demand for primary teachers' self-learning and capacity building as well as studies evaluating the impact of E-learning materials to the teachers' learning and teaching. Therefore, research project "Development of E-Learning Course-Ware for Capacity Building of Primary Teachers" not only meets the primary teachers' needs of regular learning in the future, but also reinforces theory and enriches application of E-learning in training.

1.2. Basic concepts

1.2.1. Instructional materials

According to Greenwood dictionary: *"instructional materials are Items used to assist in imparting knowledge or developing skills. Examples include textbooks, audiovisual resources, computer programs, and laboratory supplies"* (page 181), excluding supporting equipment.

In English, the term "học liệu" is "instructional materials", which can be interpreted as electronic teaching and learning materials, linked with teaching on the computer and online [31]. Besides, in English, there are some other terms related to the term Instructional materials: Teaching materials, learning materials, Instructional materials.

1.2.2. E-learning

Currently, there are many different concepts of E-learning. According to us, "*E-learning is most commonly understood as the process of learning and learning management*

through electronic devices. Nowadays, with the development of information and communications technology especially web technology E-learning is often understood as the process of learning based on the internet communication technology".

1.2.3. E-learning materials

The concept of E-learning materials or also called electronic instructional materials recently appears, in the era of digital technology, so there is no precise definition. The most common notion of the electronic instructional materials is that documents are stored and delivered in electronic or digital form and can be processed by computers.

Today, E-learning materials are stored on the server. With the development of IT and web technology, teachers and learners can access and exploit for teaching and learning easily. According to Dusan Krnel, Barbra Bajd, (2009): *"E-learning material is a pedagogical plan which is accessible and easy to understand, along with multimedia and interactive elements for independent study or for teaching"* [48]. The dissertation on E-learning materials bases on this concept.

1.2.4. Capacity building

Capacity building for teachers is the accretion, development of subject knowledge, and teaching skills to satisfy the requirements of education in different periods. Capacity building for teachers takes place during their teaching after initial training at the pedagogical schools. Capacity building aims at updating the pedagogical knowledge and skill, thereby helping teachers adapt to the changes of teaching environment [5].

1.3. E-learning and learning theories

E-learning is designed and developed based on theories of learning such as behavioral theory; cognitive theory; tectonic theory; connection theory.

1.4. Role of E-learning in primary teachers' self-study

- E-learning facilitates primary teachers in choosing a suitable learning content and form for their personal needs

- E-learning facilitates primary teachers in accessing to new information through various and abundant electronic instructional materials.

- E-learning can support self-examination and assessment of primary teachers' professional knowledge.

- E-learning helps primary teachers to exchange information, discuss and share teaching experiences.

1.5. Professional characteristics and development of primary teachers

1.5.1. Professional characteristics of primary teachers

Teaching profession of primary teachers is a special profession. Targets of primary teachers are primary learners aged from 6 to 12, in the process of formation and development of personality. In the process of education, primary teachers use their talent and personality to influence on the learners' personality. Results from the pedagogical labor of primary teachers is to create special products, namely elementary learners' personality. The quality and capacity of the learners show the product quality of pedagogical workers. The pedagogical impacts of primary teachers are dramatic and significant on the formation of the learners' personality which follows them throughout life. Therefore, professional activities of primary teachers are "strongly pedagogical" [17].

For primary teachers, they have to teach all subjects (excluding special subjects such as physical education, music, art, and foreign language). Therefore their quality and capacity must be more comprehensive than teachers in other educational levels.

1.5.2. Learning characteristics of primary teachers

Primary teachers have the following learning characteristics: primary teachers' learning is also a job with specific purposes; primary teachers' learning gains knowledge not only from books but also from their daily teaching; primary teachers' learning is not passive, always strongly influenced by life experiences and insights; in addition to the specified requirements on capacity building, primary teachers' learning is also voluntary.

1.5.3. Professional development of primary teachers

It is necessary to connect the initial training and continuous training. Initial training at the pedagogical schools and teacher fostering should be considered as two periods of one process. Turn the capacity building of teachers into a continuous process, for their whole professional life. For capacity building of primary teachers, it is possible to implement as follows:

- Capacity building for primary teachers through their self-study.
- Capacity building for primary teachers through training courses.
- Capacity building for primary teachers through short intensive training courses.
- Capacity building for primary teachers based on their professional activities at school.
- Capacity building for primary teachers based on the practice at class or scientific research on applied teaching science.
- Capacity building based on e-learning.

1.6. Status of regular fostering and application of information and communications technology to primary teachers' self-study

1.6.1. Conducting a survey of practical status

1.6.2. Status of content and organization of training

1.6.2.1. Status of training content

Regular training content for primary teachers currently follows the regular training program by Minister of Education & Training issued together with Circular No. 32/2011/TT-BGDDT dated August 8th, 2011 [[2]. The content includes compulsory and optional training programs (with 45 modules).

1.6.2.2. Status of training organization

In addition to periodic training as organized by Ministry of Education and Training, Department or Office of Education and Training also organizes training courses with the purpose: wide spreading the training program held by Ministry of Education and Training; training of the contents at the request of local elementary education development. The forms of training are professional activities by areas; attending the performance of teaching; teacher makes their own training plan.

1.6.3. Status and demand of application of information and communications technology to teaching, self-study, and self-training of primary teachers

- *Status of primary teachers' knowledge and skill of using IT:* Primary teachers at the moment are relatively good at using word processing software and software related to supporting teachers in making electronic lesson plans or software used to design electronic lesson plans, Violet presentation software, Web sites, and social network.

- *Status of application of IT to teaching:* About 97.2% of teachers have applied IT to teaching. However, 25.5% of teachers who are not interested only apply when required by the school management or by the teaching festival. The number of teachers who actively exploits and applies IT to teaching is mostly young teachers, working for city schools with good IT infrastructure and Internet.

- The current level of satisfaction of E-learning materials to self-study and self-training of primary teachers: 38.7% of teachers search information online for studying and capacity building. The higher and higher percentage of teachers using the Internet to search information online for learning and capacity building shows that online resources are relatively rich enough for teachers to exploit. The most accessible websites as the reference for teachers include Violet, open library (Thư viện mở), Test Papers (Đề thi), Learn forever (Học mãi). These websites have a lot of electronic lesson plans, quizzes, test papers and pictures which teachers can use in their lessons.

69.6% of teachers think that online documents are relatively abundant, partly meeting the users' needs; 85.3% of teachers say that online documents are abundant but unsecure and without the competent authorities' evaluation and appraisal; 72.2% of teachers indicate that materials on the Internet currently do not have much suitable content for teachers' demand of regular training.

- Demand of E-learning materials for self-study and capacity building of primary teachers: This dissertation has conducted a survey of the needs of e-learning materials for primary teachers' self-fostering and self-study. It shows that today up to 88.5% primary teachers think that it is necessary to develop electronic instructional materials; developing instructional materials with standard content and in consistency with the regular training program for primary teachers as stipulated by Ministry of Education and Training issued 97.5%. Thus we can see that the current demand of electronic instructional materials for primary teachers' self-learning and self-training is very high.
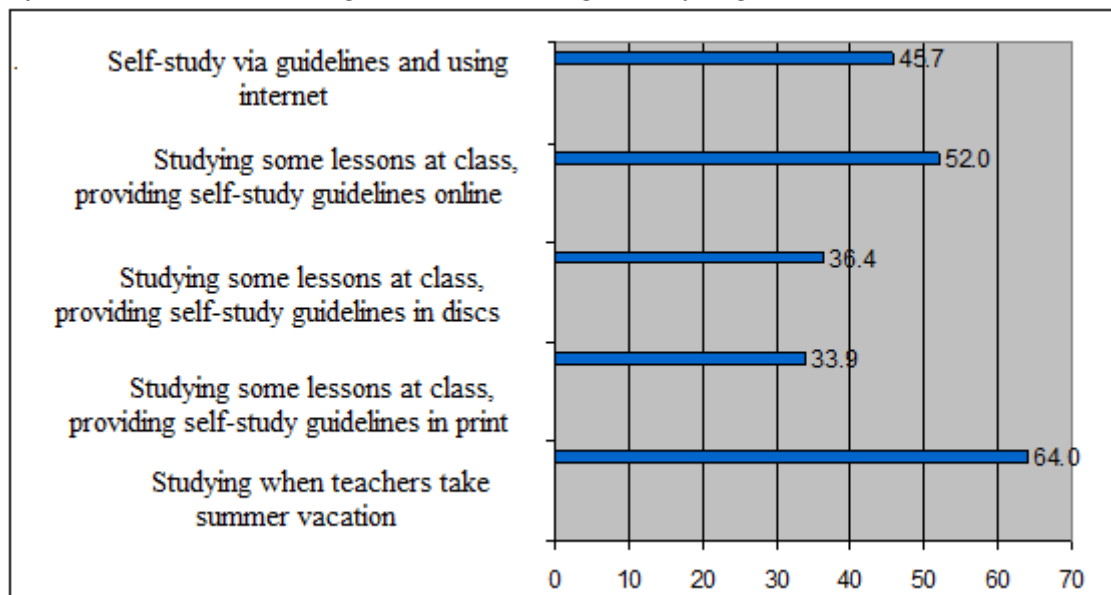

Figure 1.4: Primary teachers' opinions on forms of training

- Primary teachers' demand of self-study: As per the survey, it shows that traditional training, i.e. studying at class, is chosen by 60% of primary teachers who wish to study in summer. Next, 52% chooses studying some lessons at class, providing documents and instruction online and 45.7% chooses online training

1.6.4. Overview on the status

1.6.4.1. Strengths

- Based on Occupation standard of primary teachers, Ministry of Education and Training develops the content and documents for regular training for primary teachers.

- Forms of training are more and more various

- In addition to traditional training materials, on Internet there are E-learning materials for primary teachers' self-study and self-training.

1.6.4.2. Limitations and causes

- Organizing training classes for teachers wastes time and money, is not efficient for training, and does not meet the teachers' needs. Training organization is different in different provinces. In some provinces, it is formalistic, so the quality is not high.

- Quality and effectiveness of training are not high.

- Teachers participating in training course do not have enough time to study and understand the training content because the training time is too short.

- Training documents are not good and fit the needs.

- E-learning materials for self-study and capacity building are not appropriate with the demands of capacity building, are not diverse and quality is not tested.

Conclusion of chapter 1

Results from research of theories and practical basis in Chapter show that:

- Researches have confirmed the advantages and the ability to apply E-learning to teacher training and capacity building. The teacher training programs will be more effective in the form of combination.

- Developing E-learning materials must base on learning theories, especially pay attention to the teachers' learning characteristics and needs.

- Primary teachers training activities in the recent years have partly met the practical requirements. But there are still many shortcomings: training programs were not highly effective; regular training documents are not much, mostly traditional printed instructional materials, difficult to store, access of primary teachers is limited.

As a result, it is necessary to conduct a research on designing, building and developing E-learning materials in response to the primary teachers' demands of self-study and capacity building; with the primary teachers' IT knowledge and skill, they absolutely can use and exploit E-learning materials for their self-study and capacity building.

CHAPTER 2
DESIGNING E-LEARNING MATERIALS SYSTEM FOR PRIMARY TEACHERS BASED ON NETWORK COMMUNICATIONS TECHNOLOGY

2.1. Designing E-learning materials system for primary teachers

2.1.1. Design principles

Based on the role of E-learning materials system for the primary teachers' self-learning and capacity building, E-learning materials system is built according to the following principles: Diversity; Organization; Effectiveness; Allocation of training content; Accessibility; Compatibility with standard; Utility, adaptability.

2.1.2. Design processes

E-learning materials system supporting the primary teachers' self-study and capacity building is developed in the following process: analyze demands, design, build, test, and evaluate.

2.2.3.2. System structure

Apply the general functional model of E-learning system and functional model of instructional materials system to design. E-learning materials system for primary teachers has the following structure:
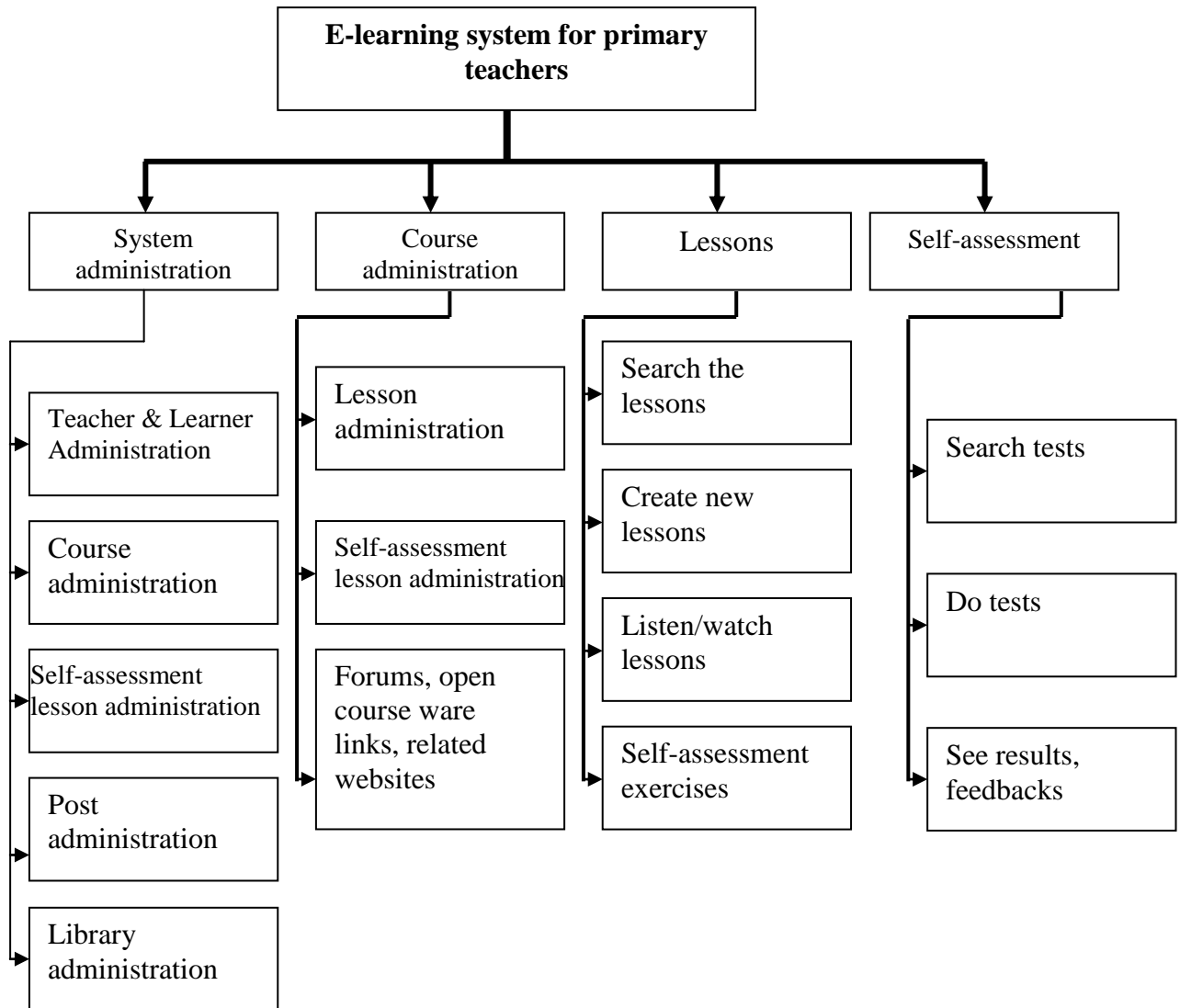
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                    ┌─────────────────────────────┐
                    │  E-learning system for      │
                    │        primary teachers     │
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System administration	Course administration	Lessons	Self-assessment

		Search the lessons	
Teacher & Learner Administration	Lesson administration		Search tests
Course administration	Self-assessment lesson administration	Create new lessons	Do tests
Self-assessment lesson administration	Forums, open course ware links, related websites	Listen/watch lessons	See results, feedbacks
Post administration		Self-assessment exercises	
Library administration			

Figure 2.2: Structure of E-learning system for primary teachers

- **System administration:**
  - *User administration (Teacher, Learner):* Administer learners' enrollment.
  - *Course administration:* This is an important part of e-learning materials system for primary teachers. Course administration allows the administrator to perform tasks related to the course such as creating, editing, deleting, setting (open, hidden, privacy).

  Post administration: Manage posts in columns: News, Notification, Learners' feedback.

  Library administration: The system allows to create and manage the library according to classification of documents, instructional materials which the administrator wants to facilitate the learners' exploitation and use

  Each course of the system is designed to build an independent module, easy to update the course content.

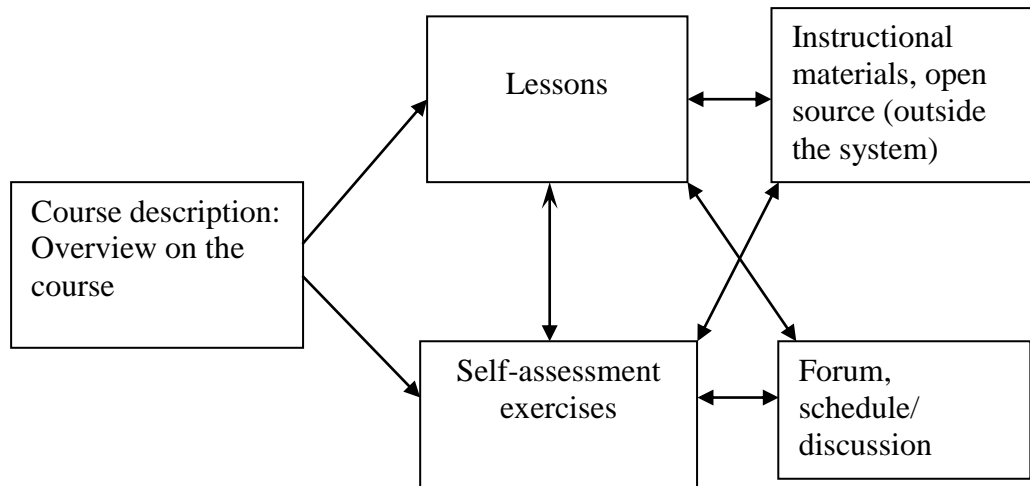 All instructional materials in a course is organized as per figure 2.11 below:

Figure 2.6: Organization of instructional materials in a course

Instructional materials are organized consistently for all courses. Opening is the course description. This section will present an overview of the course, the objectives, and the prerequisites for taking the course.

2.3. Illustrating E-learning materials via digitalized modules based on Web technology and Internet

2.3.1. Description of some modules for regular training

 - Module 1: Internet – Information search and exploitation [35]
 - Module 2: Application of Microsoft PowerPoint in teaching [34]
 - Module 3: Using education software in primary schools [33]
 - Module 4: Some basics about the primary teaching psychology [18]
 - Module 5: Psychological problems of gifted students, weak students, and special students [26]

2.3.2. Some examples

Course 1: ICT for primary teachers

1) Course description: Overview on the course and course objectives.

Regarding to knowledge:
 - Understand Internet network and how to use a web browser.
 - List the knowledge of content, method, technology, and their relationship so that applications in teaching.
 - Be able to analyze theoretical basis and apply WebQuest technique to teaching.
 - Be able to use basic features of Microsoft PowerPoint to create presentations for teaching in primary schools.
 - Know how to use mind map.
 - Know how to search information on Internet.
 - Know how to send and receive emails.

Regarding to skill:
 - Be able to search information online.
 - Send and receive emails.
 - Be able to design WebQuest.
 - Be able to design mind map for teaching

2) Lessons: course has 7 lessons as below:

- Lesson 1: Learn about the Internet.
- Lesson 2: Instructions on how to use a browser
- Lesson 3: Rationale for the application of ICT in teaching.
- Lesson 4: Instructions on how to use PowerPoint.
- Lesson 5: WebQuets in teaching.
- Lesson 6: How to use ImindMap.
- Lesson 7: Recommendation of some learning support websites.
  3) Exercise: course includes 5 exercises as below:
- Multiple choice test on Internet.
- Multiple choice test on how to use a browser and email.
- Multiple choice test on application of ICT to teaching.
- Multiple choice test on how to use Powerpoint.
- Multiple choice test on how to use WebQuest.
  3) Instructional materials: In addition to the above lessons and exercises, the course content is also integrated with open courseware, resources from social network such as:
- Instruction on how to download and set up the browser
- Instruction on how to use email
- Some videos giving instruction on how to use violet
- Some videos giving instruction on how to use powerpoint
- Instruction on how to use eMindmap.

Course 2: Psychology of primary pupils and teaching in primary schools

1) Course description: Overview on the course and course objectives:

Regarding to knowledge:
- Raise accountability, occupational ethics, love job and respect children.
- Understand the psychological characteristics of primary pupils.
- Know the characteristics of the pupils' learning activities and teachers' teaching activities, and also know the dialectical relationship between training and learning activities with the development of pupils' psychology.
- Be able to present psychological characteristics of peculiar, weak, and gifted students in order to apply appropriate teaching method.
- Be able to present principles, processes, and requisites in learning about pupils' psychology.

Regarding to skill:
- Be able to use some simple methods, techniques to understand psychological characteristics of peculiar, weak, and gifted students
- Be able to apply suitable methods to learn about psychological characteristics of peculiar, weak, and gifted students
  2) Course lessons:
- Lesson 1: Primary teachers and teaching in primary schools
- Lesson 2: The levels of mental development and learning activities of primary pupils.
- Lesson 3: Psychological characteristics of peculiar, weak, and gifted students
- Lesson 4: Teachers' teaching activities and pedagogical solutions.
- Lesson 5: Teaching and learning quality, how to assess teaching and learning outcomes.
  3) Exercises: Course includes the following 5 exercises:

– Learning about Primary teachers and teaching in primary schools.
– Quizzes on psychology of primary pupils.
– Quizzes on psychological characteristics of peculiar, weak, and gifted students
– Exercise on innovation of teaching methods
– Quizzes on assessment of teaching and learning outcomes.

4) Instructional materials: course exercise is linked to open course ware and resources on social network:

– Video/Audio files contain documents related to general psychology.
– References in word, pdf, and PowerPoint related to psychology of primary pupils, teaching in primary schools and evaluation of pupils' learning outcomes.

Course 3: New School Model for Vietnam (VNEN)

1) Course description: Overview on basic content of the course, course objectives, and requirements of knowledge, skill, and attitude:

Regarding to knowledge:

- Understand what a New School Model for Vietnam is.
- Know how to teach according to New School Model for Vietnam and teaching in groups.
- Understand the role of learning corners, community map and classroom library.

Regarding to skill:

– Facilitate pupils in selecting a class management
– Facilitate pupils in learning in groups, complying with learning steps in the new school model.
– Establish a learning corner, community map.
– Be able to evaluate pupils according to new school model.

2) Lessons: Course includes the following lessons:

– Lesson 1: What is a new primary school model?
– Lesson 2: Organize class according to New School Model for Vietnam
– Lesson 3: Teaching in groups.
– Lesson 4: Learning corner and role of a learning corner.
– Lesson 5: Class library in the new school model.
– Community map and the importance of a community map.
– Instruction on how to teach Science grade 5.

3) Course exercise:

– Exercise on class organization according to the new school model.
– Exercise on teaching according to new school model.
– Exercise on the roles of learning corner, library and community map.
– Multiple choice test on evaluation of pupils according to the new school model.

4) Instructional materials: This course links to the following open resources and courseware:

– Videos on class organization according to the new school model (selecting the class management, decorating the class, building the community map,..).
– Some videos on teaching according to the new school model (the illustrating class such as Maths, Vietnamese,..).

– Documents on evaluation according to the new school model; renovating assessment published in professional publications and forums.

2.4. Principles and forms of using E-learning materials

2.4.1. Principles for use

Principle 1: Appropriate with the primary teachers' demands of regular self-study and capacity building together with professional activities.

Principle 2: Ensuring consistency with primary teachers' learning characteristics, i.e. consistent with adults' learning characteristics.

Principle 3: Ensuring knowledge and skill development according to the course objectives.

Principle 4: Exploiting the primary teachers' experience.

Principle 5: Exploiting IT strengths, especially Internet technology during learning.

2.4.2. Forms of teachers' using E-learning materials system for self-study and capacity building

2.4.2.1. Form 1: Primary teachers learn with built-in electronic instructional materials

The above designed and built E-learning materials system is very convenient for primary teachers' self-study without any instructor. With this form, E-learning materials system are set "open", a public system. In this form instructional materials system will have a number of characteristics as follows:

– Primary teachers do not need to register as a member of the system, but they still can learn.

– Forums are fully open. Teachers are free to participate in discussions, write articles whenever the need arises.

– Content and instructional materials of courses are open and accessible by anyone.

– When the learner does his/her exercise and self-assessment test, the result is not stored by the system.

– When accessing to the system, the primary teachers are free to discuss but cannot make friends and establish learning groups.

Consequently, with "open" from if the primary teachers or anyone else want, they can access to the instructional materials system, search for information by themselves, exploit instructional materials for their self-study, with the motto "Learn what they like".

2.4.2.2. Form 2: Primary teachers learn with the built-in courses

After registering a course and being accepted by the course administrator, the primary teachers become a participant of the course. The participant must follow the steps as below:

Step 1: Read the course description carefully

Step 2: Participants do pre-test before learning.

Step 3: Self-study lessons in the course. When self-studying, learners need to do as follows:

- Answer questions related to the lesson;
- Check feedback, pay attention to wrong answers;
- Review the lesson, pay attention to wrong answers in the exercise. Normally, wrong answers are red and right answers are blue.
- Watch videos illustrating the theory (if available). Illustrating classes are built in or integrated in the lesson;
- Re-do the exercise related to the lesson.

Step 4: Participate in the forum, discuss, share difficulties during learning and teaching experience.

Step 5: End the course. Learners do the exercise in order to evaluate their performance after the course, with reference to the course objectives.

2.4.2.3. Form 3: Self-study with the courses including the teacher/course manager

This is teachers' self-study with instruction. With this form of learning, learners have to register the course and seek the approval of the teacher or the course manager. Then E-learning materials system has the following characteristics:

– Course is set "private course" by the system administrator, i.e. only for the approved learners. Then a learner is only allowed to take part in this course.

– Lessons in the course, instructional materials, and exercises are always updated in response to the learners' needs.

– Discussions, writings, and results of learners' exercise are stored. Each exercise is systematized into a transcript for learners.

– Teacher, course administrator can plan the discussion and Q&A session for learners. As a result, learners' needs, difficulties and concerns are timely solved.

– Learners' self-assessment exercises can be their writing sent to the teacher/administrator, who will mark and send feedback to learners. Learning steps are:

– When participating in this type of learning, learners need to follow 5 steps in form 2.

– Do the exercises, discuss in groups as per teacher/course administrator's plan.

– With step 5, participating in the forum and discussion learners need to propose new topic at Create a new topic in the forum so that all learners can together discuss and find the solutions. Topics created by a learner need to be: related to the course; difficulties during learning; difficulties during teaching which are in need of the help in the course.

This form also needs a teacher/course administrator who directly manages and follows up learners' learning, also the system stores and evaluates the learners' performance.

Conclusion of chapter 2

Based on the research of rationale and practice in chapter 1 and chapter 2, the dissertation focuses on developing E-learning materials system in order to satisfy primary teachers' needs of self-study and capacity building. Research results in this chapter include: Identify design principles of E-learning materials system for primary teachers; Identify design processes and develop instructional materials; Develop instructional materials for 03 courses as an illustration; Propose principles so that primary teachers can exploit E-learning materials for self-study and capacity building; Propose forms of using E-learning instructional materials for their self-study.

CHAPTER 3. EXPERIMENTAL PEDAGOGY

3.1. Implementation of experiment

3.1.1. Aims

- Are E-learning materials designed and developed like that suitable to characteristics and learning needs of primary teachers?

- How do E-learning materials influence on the primary teachers' self-study and capacity building?

3.1.2. Subjects, location and time for experiment

Experimental subjects: Primary teachers are teaching from grade 1 to grade 5.

Location for experiment: 02 primary schools in Hanoi, 03 primary schools in Nam Dinh, 02 primary schools in Thai Binh, 03 primary schools in Ho Chi Minh City, 06 schools in Da Nang City (annex 4).

Time for experiment: From September, 2014 to February, 2015.

3.1.3. Content of experiment: Test and evaluate the design and development of E-learning courseware system; evaluate the functions and interaction of E-learning courseware system; assess the method of organization and courseware content; evaluate the method of exploiting courseware for primary teachers' self-study; Assess the impact of instructional materials on the primary teachers' self-study and other professional activities; Assess the feasibility of the instructional materials system.

3.1.4. Method of experiment: Observation; Seminar; Questionnaire

3.2. Results from experiment

3.2.1. First round experiment:

Aims of first round experiment: First round experiment aims at assessing the design and organization of the courseware system, the functions of E-learning courseware system, discovering the difficulties which primary teachers may encounter during their self-study so that instructional materials can be adjusted more suitably.

Method: Observe how primary teachers use -learning materials system for their self-study, discuss with IT experts about difficulties which primary teachers may encounter during their self-study so that instructional materials can be adjusted more suitably.

Implementation: Establish a group with 10 teachers and 02 educational researchers who are tech-savvy. Primary teachers and the researchers use the same E-learning system for their self-study according to 3 forms as suggested by the dissertation.

Findings from the experiment: When primary teachers use the courseware for their self-study and participate in the forum, we find out some problems on interaction, interface layout, and system error. The team has conducted editing, adding instructions for their self-study to the "Frequently Asked Questions" section of -learning materials system, so learners can search and register by themselves and participate easily.

3.2.2. Second round experiment

Total questionnaires are 250. When processing data, the dissertation analyzes data based on qualification, age, and teaching location of the teachers.

3.2.2.1. Evaluate the instructional materials and primary teachers' capacity of using E-learning materials

– Evaluate interface, the layout of the system: The results indicate that the interface and layout of the E-learning system is fit with primary teachers. No one thinks it is inappropriate.

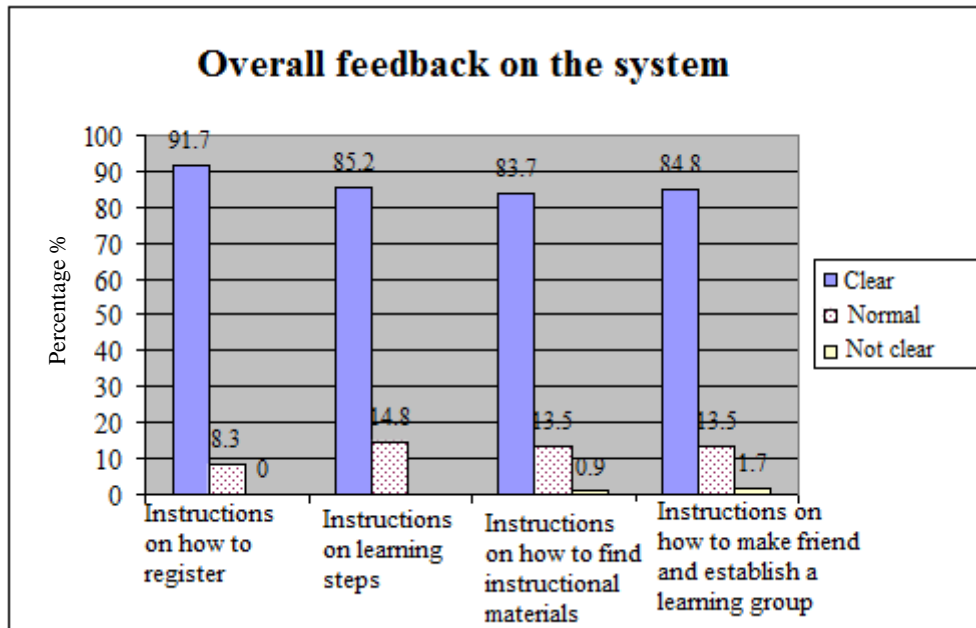– Overall feedback on the system:

Figure 3.1: Overall feedback on E-learning system

Figure 3.1. shows the percentage of comments. For each question, we divide into 3 categories: clear, relatively clear, not clear. Designed E-learning system is generally consistent with primary teachers' ability. Most teachers can register, follow the self-study steps, make friends, and establish learning groups. Review the organization of content, Instructional materials in the courses.

Results show that the organization of instructional materials in the courses of E-learning system is suitable, easy for primary teachers' self-study. Content of the course is consistent with the course objectives. Regarding to the allocation of content,

Course content is fit with the course objectives. Regarding to the content allocation, lesson takes up higher percentage, primary teachers think it's appropriate and relatively appropriate. 80.4% of teachers express that the self-assessment test helps teacher to evaluate their knowledge before learning, 18.7% of teachers are unsure and 0.9% of teachers do not agree.

Regarding to the suitability, marking, showing result and giving feedback to learners of the system, 64.7% of teachers consider it's appropriate and 0.9% of teachers think it's inappropriate for learners. 34.3% of teachers are unsure. Up to 78.3% of teachers believe that open linked resources and courseware on the internet are appropriate, 20.4% unsure and 1.3% inappropriate. 85.2% of primary teachers agree that content and design of the course reflect the features of primary education, appropriate with learning needs and capacity building.

Through analysis of above feedbacks on instructional materials and E-learning system for primary teachers, it can be concluded that:

+ E-learning materials is designed and built appropriated with the primary teachers' needs of self-study. Exercises can orient the primary teachers' self-study and capacity building.

+ In addition to built-in instructional materials, open resources and courseware on the internet linked to the lessons and self-assessment test are also highly appreciated and considered as a good instructional materials for their self-study.

+ E-learning system has proper architecture and interface, easy for primary teachers to use during their study. The primary teachers can register by themselves.

+ Instructional materials are designed and E-learning system for primary teachers is built in order to be applied in practice.
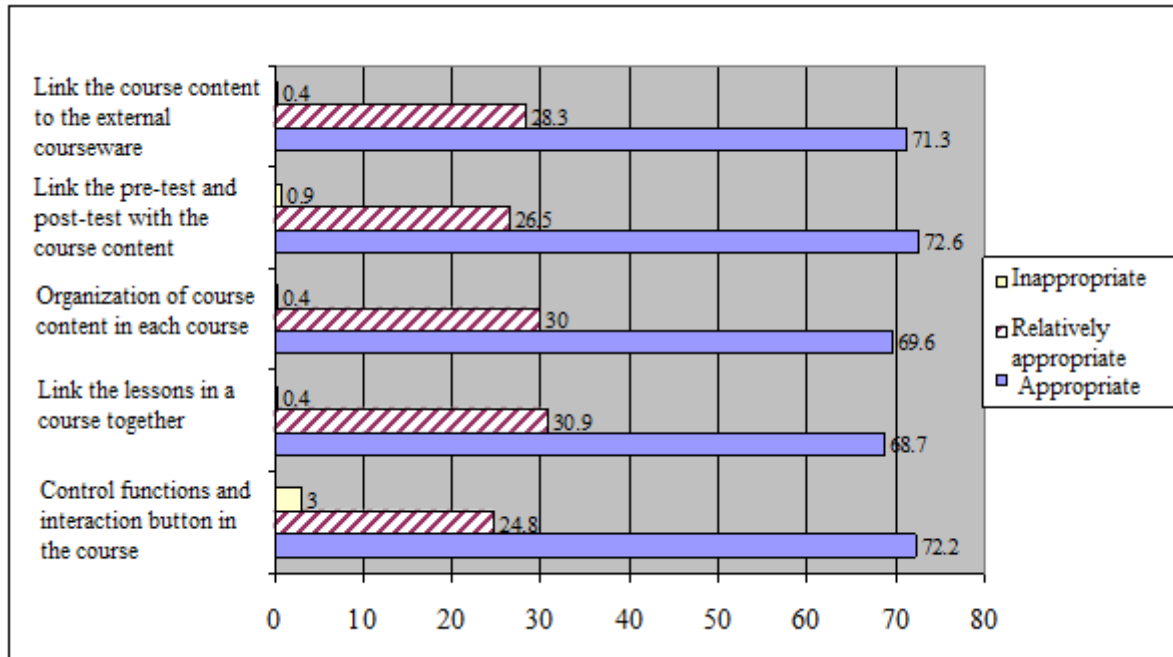

Figure 3.2: Feedbacks on the organization of instructional materials

3.2.2.2. Impact of E-learning materials on teachers' learning

To assess the impacts of E-learning courseware and E-learning system on primary teachers' self-fostering and self-study, the dissertation has asked for the teachers' feedbacks on the following aspects:

+ Online self-study helps teachers arrange suitable time for their self-study.

+ Online self-study is more attractive to teachers because there are photos and audio.

+ Online self-study increases the interaction and sharing among teachers and is more attractive.

+ Online self-study makes teachers more confident and comfortable when discussing, sharing information and showing their comments.

+ Sharing in the forum helps teachers solve their difficulties during their self-study.

+ Up to 98% of primary teachers think that online self-study helps teachers arrange suitable time and location. This is also an advantage that teachers can both study and teach.

+ Figure 3.3 illustrates that up to 92.4 % of teachers agree that online self-study makes them more confident and comfortable when participating in the forum (virtual classroom), discussing and sharing information, they do not hesitate to raise their voice. During their self-study, teachers also face difficulties, especially self-study in E-learning environment, a new learning environment, up to 91.2% of primary teachers express that thanks to forum they can overcome their difficulties during learning.
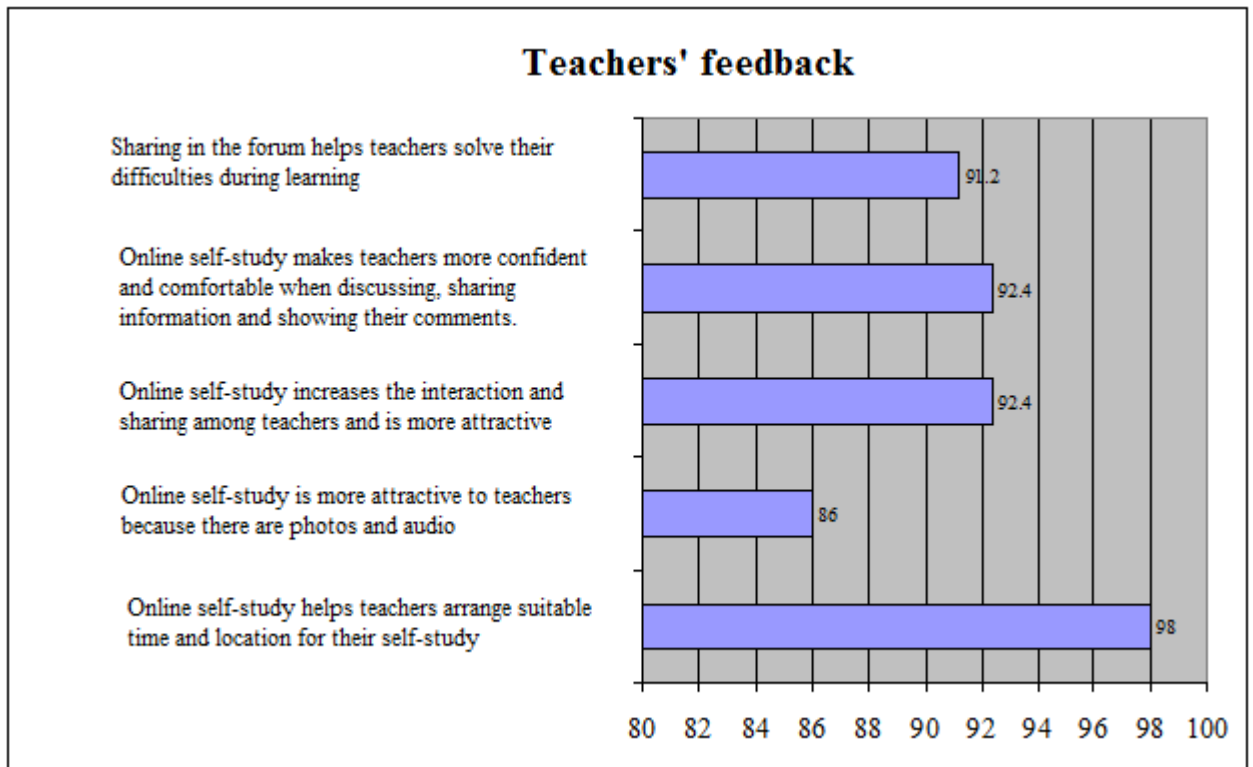
Figure 3.3: Evaluating the impacts on self-study

The study results show that 92.4% of teachers think that online self-study increases interaction, information sharing, and attraction to teachers. Teachers' interaction with electronic instructional materials and interaction between teachers and teachers make learning more attractive. In normal learning and teaching environment, teachers can only exchange, discuss professional issues with colleagues at school, in the professional group activities but with E-learning system teachers can exchange and discuss with other teachers all over the country.

One of the factors that online study can attract more learners is there are photos and audio. The study results showed that for primary teachers sound and images are highly attractive, accounting for 86%. However, for primary teachers who are highly qualified, this is rated the lowest.

The dissertation also analyzes the impacts by age and tests the Ho hypothesis. Results from Ho Hypothesis Testing "Online self-study with images and sounds is more attractive to teachers" with $P < 0.05$. Thus, the selected samples in this study show that there is relationship between age and impact of images and sounds. For teachers under 25 years old, images and sounds are less attractive.

Results from analyzing the impacts by qualification show that for the factor "online self-study helps teachers arrange suitable time and location", there is a large gap between teachers of different qualification levels. 100% teachers with Master degree agree with this opinion. In contrast, only 80% of teachers with vocational pedagogy degree agree. Ho Hypothesis Testing in this case, Ho = 0.03 < 0.05, is rejected. Therefore, there is connection between qualification and this idea. The percentage of teachers with vocational pedagogy degree rating "online self-study helps teachers arrange suitable time and location" is the lowest.

97.4% teachers in the rural areas evaluate "*Online self-study makes teachers more confident and comfortable when discussing, sharing information and showing their*

comments", only 90.2% in the urban areas. Ho Hypothesis Testing P = 0.05. If reliability is 95%, with the selected samples in this study Ho Hypothesis can be rejected, i.e. there is relationship between this impact and teachers in two different areas.

3.2.2.3. Impacts of E-learning materials on teachers' learning performance

To assess the impacts of E-learning courseware to the primary teachers' learning performance, the dissertation seeks respondents' evaluation of impacts on their learning performance:

- E-learning system enables teachers to update the professional knowledge the fastest.
- E-learning system helps solving teachers' difficulties in looking for documents for their self-study.
- Self-study with E-learning helps teachers regular their pedagogic knowledge and skill.
- Through online study, teachers' application of information technology to teaching is more effective.
- Online self-study facilitates teachers' professional activities.

Table 3.9: Evaluation of impacts on teachers' learning performance

Impacts on teachers' learning performance	Percentage of agreement
E-learning system enables teachers to update the professional knowledge the fastest	78.4
E-learning system helps solving teachers' difficulties in looking for documents for their self-study	82.4
Self-study with E-learning helps teachers regular their pedagogic knowledge and skill	87.6
Through online study, teachers' application of information technology to teaching is more effective	92.4
Online self-study facilitates teachers' professional activities	90.0

Results from Table 3.9 show that 78.4% of respondents say that E-learning system enables teachers to update the professional knowledge the fastest. Electronic instructional materials are easily updated, shared on the network, different from the traditional instructional materials, so when teachers use E-learning system for learning, they can access to new sources of information the most quickly because the system always updates the latest information related to their professional activities in the primary education. Moreover, during their leaning if teachers have any new information or documents, they can share documents with friends, colleagues via E-mail, Facebook, Tweet, help friends update the information as quickly as possible for example articles, discussions about the renewed assessment; evaluation in accordance with Circular 30; about the New School Model for Vietnam, .

With E-learning materials, teachers can search for their study quickly via search engines. Teachers only need a computer or smart phone with Internet connection, then they can search when needed. Therefore 82.4% of teachers think *"E-learning system helps solving teachers' difficulties in looking for documents for their self-study".* When asking about three things teachers feel the most excited at using instructional materials from E-learning system, 37% of teachers indicate that it is easy to search and access to the learning

materials, the link between lessons and open resources and other websites brings abundant instructional materials to teachers, which does not take time for searching. Consequently, appropriate design and organization of instructional materials for primary teachers encourages them to self-study.

As a result, courses designed and built by the research title are highly valued by the primary teachers and have positive impacts on teachers' learning performance when 90% of teachers agree "Online self-study facilitates teachers' professional activities".

The dissertation also analyzes impacts of E-learning materials by age of primary teachers. Results from table 3.10 indicate that regarding to factors affecting primary teachers' learning performance by age, the difference is not high. Two impacts: *"Through online study, teachers' application of information technology to teaching is more effective"* and *"Online self-study facilitates teachers' professional activities"*, the difference is quite high, 11.9% and 9.4% respectively. To find out if such factors depend on the age of primary teachers or not, the research team has conducted the Ho hypothesis test. The Ho hypothesis test result shows that P is greater than 0.05, so Ho hypothesis cannot be rejected, i.e. the impacts of e-learning materials on the primary teachers' academic performance does not depend on age.

Besides the study on assessing the impacts of e-learning materials by primary teachers' age, the research also figures out if such factors are influenced by the primary teachers' qualification.

Therefore with this study, it can confirm such impacts do not depend on the primary teachers' qualification.

Therefore, there is no different between teachers in the rural areas and teachers in the urban areas.

3.2.2.4. Advantages and disadvantages of instructional materials

Through the testing process, consulting primary teachers' comments, especially through the points that teachers like the most when learning with E-learning system, here are the advantages:

- Instructional materials and E-learning system have exploited the advantages of ICT in education;
- Primary teachers think instructional materials and E-learning system have beautiful design and interface, attract viewers, the clear instructions, and convenient for teachers' self-study;
- Control functions and interaction buttons are convenient for primary teachers to interact with instructional materials during learning;
- Link the self-assessment test with lessons in the course, instructional materials, and open resources. Link with websites containing information related to courses for teachers' reference during learning;
- Primary teachers can learn, access to IT, and search information easily;
- Primary teachers can make friends, establish study groups, discuss and share experience;

However, besides the above advantages, instructional materials and E-learning materials system have some certain disadvantages such as:

-   Lesson content is not allocated properly. In some lessons, content is too long and needs more pictures;
-   Number of courses is just illustrative, not much, and not various so it does not satisfy different needs of different teachers.
-   The system needs more videos so teachers can have more reference.
-   Documents in the library must be diverse in order to meet the needs of primary teachers.
-   For old primary teachers, they face difficulties in using E-learning courseware system.

3.3. General evaluation on the experiment
3.3.1. Pedagogical impacts of E-learning courseware system

Experimental pedagogy has assessed the impacts of E-learning courseware. Experiment results show that designed and built E-learning materials are appropriate with the primary teachers' self-study. Instructional materials have interesting text, picture, and audio materials, attracting teachers. Test before taking the course and test in the course orient and adjust teachers' study. E-learning system is integrated with instructional materials and open online resources, which facilitates teachers' search for instructional materials.

Through E-learning courseware system, primary teachers can make friends, establish study groups, share experiences with colleagues in consistency with learning characteristics. Therefore, it encourages teachers to actively participate in learning.

Besides, courseware system has positive impacts on to the primary teachers' self-study, facilitate their self-study, provides regular updated knowledge and pedagogic skill, contributes to their capacity building; through online learning, the primary teachers can improve their IT knowledge and more effective application of IT to teaching

3.3.2. Feasibility of instructional materials

Instructional materials are designed and built based on the regular training modules and new training content, satisfying teachers' needs of self-study. Instructional materials and E-learning system designed and built by the dissertation are feasible and suitable to teachers' qualification and IT skill, facilitate teachers' self-study.

Research results show that 99.7% of teachers say that they will continue accessing to the website of instructional materials system and also 99.7% teachers agree to recommend this website to their colleagues for reference. In the training of the primary teachers according to the new school model (from 3th to 7th June, 2015) some have recommended the website with the participants.

Through the statistical software of the system from March 1st, 2014 to May 30th, 2015, there are 23,000 visitors, from 150 to 300 visitors a day.

In addition, the number of searches using the "keywords" related to the keyword or the content of the system has also increased. Most users use search engines like Google and Bing.

Thus, through experimental results and statistics on the use of search engine related to keywords of Instructional materials, the number of access and use of (the number of clicks) the system daily shows that E-learning materials system for primary teachers designed and built by the dissertation meet the learning needs of primary teachers and are absolutely feasible in the current period.

Conclusion of chapter 3

- E-learning materials and E-learning system designed and built are appropriate with the learning needs and characteristics of primary teachers. The primary teachers can learn anywhere, any time when needed. It does not affect their professional activities. Instructional materials are abundant and diverse. They feel confidently when discussion and sharing information, so it encourages teachers to self-study.

- Instructional materials system designed and built are appropriate with the primary teachers' self-study. Self-assessment exercises give feedbacks which can orient and adjust the primary teachers' self-study. The primary teachers can solve their problems right when they are studying. On the other hand, the link between instructional materials of the system with open online resources and instruction materials is highly valued by the primary teachers and saves time of searching for documents for teachers.

- Self-study with E-learning materials system help the primary teachers: Update knowledge quickly; contribute to solving their difficulties in searching for documents; continually improve professional knowledge and skills; and facilitate teachers' professional activities.

- The study results show that scientific hypothesis is correct, the development of E-learning materials suits the primary teachers' characteristics and needs of self-study as well as taking advantage of IC and Internet will boost the primary teachers' self- study and capacity building.

- With primary teachers' IT skill and knowledge, they can well-exploit E-learning materials system for their self-study and capacity building

CONCLUSION AND RECOMMENDATION

1. Conclusion

In the basic and comprehensive innovation of Vietnamese education, one of the key solutions is to develop teachers to meet the requirements of the innovation. The dissertation designs and builds E-learning materials to meet the primary teachers' needs of self- study. Here are some results:

Regarding to rationale:

- Clarify the definitions of instructional materials, E-learning instructional materials, and capacity building.

- Contribute to clarify the relationship between E-learning and learning theories; professional characteristics and professional development of primary teachers; the role of ICT and E-learning materials in supporting the primary teachers' self-study and capacity building.

- Propose principles, design processes, build E-learning materials in consistency with learning characteristics and in response to the primary teachers' needs of self-study and capacity building.

- Propose the method of organizing E-learning materials in each course, link the instructional materials of the system with open resources and instructional materials online to promote the advantages of the internet communication technology.

- Propose methods of using E-learning materials system for the primary teachers' self-study and capacity building.

Regarding to practice:

- The thesis has designed and built E-learning course materials system including 03 illustrative course based on some regular training modules for primary teachers and on some new problems in primary education (New School Model for Vietnam).

- The thesis has tested and consulted primary teachers' evaluation on the design and development of E-learning instructional materials, impacts of E-learning materials to their self-study and capacity building.

Experimental results show that:

- E-learning materials system designed by the dissertation which base on the academic theories applied to E-learning environment, learning characteristics are appropriate with the primary teachers' self-study and capacity building. With E-learning materials system, primary teachers can learn anytime and anywhere.

- E-learning materials system designed has exploited the advantages of ICT, integrated with network services and open courseware resources, and established a virtual learning community which encourages primary teachers to study more actively. They feel more confident in the exchange, discussion and sharing of information. Facilitate their regular self-study and capacity building.

- E-learning system helps the primary teachers solve the difficulties in looking for self-study materials. Self-assessment exercise with feedbacks and forum in the course help orient and adjust the teachers' self-study, solve the difficulties right in their self-study process, and contribute to improving efficiency of self-study and capacity building.

- Self-study with E-learning materials system helps the primary teachers to improve their knowledge, pedagogic skills, and IT skill quickly, which facilitates their professional activities and increases the efficiency of IT application to teaching.

- Currently, development of electronic instructional materials and e-learning system is suitable to meet the primary teachers' needs of self-study and capacity building and are absolutely feasible.

With these results, the thesis can conclude its scientific hypothesis is proper, research purpose has been achieved, and the research tasks have been completed.

2. **Recommendation:**

Based on study results, the thesis offers some recommendations:

For Ministry of Education and Training:

– Consider e-learning is an effective way of training. Continue directing research bodies, education authorities at all levels, and educational institutions to conduct research and apply E-learning in training.

– Newly build and complete the existing E-learning system for the teachers' self-study and capacity building.

– Establish evaluation criteria and confirmation of teachers' self-study performance through E-learning in order to boost their regular self-study and capacity building.

For research agencies:

– Promote the studies and complete the rationale for application of E-learning to teaching. There are in-depth studies on assessing the impacts and effectiveness of self-study via E-learning.

– Continue researching, designing and developing E-learning model for training.

For primary schools and primary teachers:

– Innovate the content and method of self-study. Consider E-learning as an effective way of self-study.

– With current IT knowledge and skill, primary teachers in particular and teachers in general surely can exploit E-learning materials system for their self-study. Management of primary schools needs to issue policies encouraging teachers' self-study through E-learning.

LIST OF THE AUTHOR'S PUBLISHED WORKS RELATED TO THE DISSERTATION

1. Nguyen Minh Tuan (2010), *Orientation of development of E-learning courseware model in response to the primary teachers' needs of regular training*, Journal of Education. Volume 242.

2. Nguyen Minh Tuan (2011), *Application of E-learning to teacher training courses in some European countries,* Journal of Education. Volume 264.

3. Nguyen Minh Tuan (2012), *Application of E-learning to teacher training courses in Korea,* Journal of Education, Volume 291.

4. Nguyen Minh Tuan (2013), *Overview on the application of E-learning to teacher training courses in Korea,* Journal of Education, Volume 308

5. Nguyen Minh Tuan (2014), *Application of information technology to primary teachers' teaching and capacity building*, Journal of Education. Volume 331.

6. Nguyen Minh Tuan (2014), *Learning with electronic instructional materials in online training,* Journal of Education. Special volume, June 2014.

7. Nguyen Minh Tuan (2014), *E-learning satisfies the primary teachers' needs of self-study and capacity building*, Journal of Education & Society. Volume 48 (109). August 2014.

8. Nguyen Minh Tuan (2015), *Evaluation of electronic instructional materials and their impacts on primary teachers' self-study*, Journal of Education & Society. Special volume, April.