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THE RESEARCH OF DESIGNING AND USING E-TEXTBOOOKS IN TEACHING THE TRANSFORMATIONS ON A PLANE ACCORDING TO THE ORGANIZED ORIENTATION OF DISCOVERABLE ACTS

Speciality: Theory and Method of Teaching Mathematics
Code number: 62.14.01.11

ABSTRACT OF DOCTORAL THESIS IN EDUCATION

HA NOI, 2016

This thesis has been completed at: The Vietnam Institute of Educational Sciences

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GENERAL INFORMATION
1. Reasons of choosing the theme

The strategy of educational development from 2011-2020 due to the Prime minister points out: *"Continue to inovate teaching methods and assess learning result and practice in the way of promoting enthusiasm, self-awareness, initiative, creation and self-learning competency of students. Intensify applying ICT and media in teaching, ect. Compile and use textbooks, e-textbooks, ect"*.

ICT & media are to get better and better and penetrate into all areas of science and life. The new equipment such as computer, smart phone, Ipad combining with the Internet is familiar and indispensable to life. In other words, ICT and media created a planar social which every people living in different places can interact and communicate with together easily.

E-textbooks are a concretization of applying ICT and media in teaching and learning. E-textbooks have strong points that paper textbooks do not have such as: their contents are formatted in order to see on the screen, they can be packaged and transported easily; their images are eye-catching, we can zoom in and out text size; we can interact and get feedback; there are live videos, images and sound. E-textbooks protect the digital technology right, do not allow copy and print (if users do not permit) and their content updates are usually downloaded from the Internet.

There are many countries which are especially interested in the research on designing and using e-textbooks. The idea of an e-textbook came to Bob Brown in the 1930s (he wrote this idea in the book *The Readies, Rice University Press,* 2009). In the 1980s, the US Department of Defense began concept development for a portable electronic delivery device for technical maintenance information called project PEAM, the Portable Electronic Aid for Maintenance. John K. Harkins and Stephen H. Morriss were as inventors when created it in 1985. In July 2010, online bookseller Amazon.com reported sales of e-books for its proprietary Kindle outnumbered sales of hardcover books. According to Amazon.com, it sold 140 e-books for every 100 hardcover books.

There were some works related to e-textbook in our country, for example, The joint-stock company of educational e-books EDC (The Vietnam Education Publishing House) gave the market a full pack of e-textbooks named *Classbook. Classbook* obtains all of subjects that students must learn at upper secondary school. Students can note and do exercises on its pages. *Classbook* inputs multimedia data such as video clips, sound, images, audio. If students do tests then they get the correct or incorrect feedback intermediately. The *Classbook* are especially good for English subject. If students click and press on an English word then *Classbook* displays its meaning content intermediately. There is pronunciation of each English words. For another subject such as literature, *Classbook* also broadcasts the short films on literature works made into films such as *Chi Pheo*. For musical subject, *Classbook* broadcasts songs as well as the biography and career of musicians. *Classbook* has objective tests. In the middle of 2014, *Classbook* gave the second version added to utilities, integrated with appendix, videos and simulations.

However, there have not been detail and deep studies about the designing e-textbook to help students to learn according to discoverable orientation up to now. Especially, There is nobody to research on the e-textbook that helps to learn the transformations on the plane according to the organized orientation of discoverable acts and this researched orientation is new.

From the above reasons we choose the theme of dissertation as follows "**The research of designing and using e-textbooks in teaching the transformations on a plane according to the organized orientation of discoverable acts**".

2. Aims

The designing and proposing of using e-textbook in teaching the transformations on the plane according to the organized orientation of discoverable acts and the clarifying of the active abilities of students in the process of learning will improve the effectiveness of teaching and learning mathematics at upper secondary school.

3. Objective and subjective

3.1. Objective

The process of teaching the transformations on the plane with the help of e-textbook according to the organized orientation of discoverable acts.

3.2. Subjective

The process of designing and using e-textbook in teaching the transformation on the plane.

4. Scientific hypothesis

If we point out the pedagogic requests for e-textbook and the process of designing and using e-textbook according to the organized orientation of discoverable acts in teaching the transformations on the plane suitably then we can make students active in the process of learning and improve the qualify of teaching the transformations on the plane of grade 11th at upper secondary school.

5. The content and limit of thesis

5.1. The content of research

- The theory on discovery learning, the nature and form of the organization of discoverable acts. The synthesis of the theoretical basis on designing and using e-textbook in teaching the transformation on the plane according to the organized orientation of discoverable acts; The ability of the creation of ICT and media environment according to the organized orientation of discoverable acts; The situations of teaching the transformations on the plane can organize the discoverable acts effectively; The ability of using e-textbook according to the organized orientation of the discoverable acts of existing situations.

- The requests for e-textbook according to the organization of the discoverable acts, some mathematical e-textbooks (focused on the transformations on the plane) in the world, the strong points and weak points, the using of e-textbook in teaching and learning geometry; the reality of applying ICT and media in teaching geometry in general and teaching the transformations according to the organized orientation of discoverable acts in particular at upper secondary school now.

- The rules of designing e-textbook and the process of designing e-textbook of the transformations on the plane at upper secondary school according to the organized orientation of discoverable acts. Designing e-textbook (the transformations on the plane of grade 11th at upper secondary school) according to the organized orientation of discoverable acts. The method of using given e-textbook in teaching the transformations on the plane according to the organized orientation of discoverable acts.

- Using pedagogic experiment to test the scientific hypothesis and to assess the necessary and feasible contents given by the dissertation.

5.2. The limit of thesis

Thesis limits the research of designing and using e-textbook in teaching the transformations on the plane according to the organized orientation of discoverable acts according to the advanced geometric textbook of grade 11th.

6. Research methodology

The theoretical method; investigative and observable method; expert method, case-study method and pedagogic experiment method.

7. The contributions of dissertation

- Contributing to clarify the theoretical basis of applying ICT and media to innovate the mathematical teaching methods. Building an e-textbook to help teaching the transformations according to the orientation of discovery learning.

- Proposing the pedagogic requests to e-textbook and the steps of designing and building e-textbook to help students to learn the transformations on the plane of grade 11th at upper secondary school. Using this e-textbook to other subjects.

- Proposing the method and form of applying e-textbook to help learning according to the organized orientation of discovery learning.

Chapter 1
THE THEORETICL AND PRACTICAL BASIS OF THE REASEARCH OF DESIGNING AND USING E-TEXTBOOOKS IN TEACHING THE TRANSFORMATIONS ON A PLANE ACCORDING TO THE ORGANIZED ORIENTATION OF DISCOVERABLE ACTS

1.1. Problems on the innovation of teaching and learning methods

1.1.1.The need of the innovation of teaching methods

One of key points on the full innovation of education is the methodical innovation of teaching according to the main idea of the learning activities of students: "*Teaching method which needs to orient to the organization of students who learn in activities and by the activities of self-awareness, initiative and creation is performed independently or communictively.*"

1.1.2. The orientation of the innovation of teaching methods

According to Ba-Kim Nguyen, the orientation "*Teaching method which needs to orient to the organization of students who learn in activities and by the activities of self-awareness, initiative and creation is performed independently or communictively*" can be called *the learning in activities* and *the learning by activities* for short, or can be called: *the activities of learners*. Some another forms of this orientation are as follows "*The active method*", "*The active method (or education)*".

1.1.3. Active teaching method

One of important orientations making students active is discovery learning

1.2. The organization of discoverable acts for students

1.2.1. Discovery learning

The dissertation has used the definition of discovery learning of Van Joolingen "*Discovery learning is a type of learning where learners construct their own knowledge by experimenting with a domain, and inferring rules from the results of these experiments. The basic ideas of this kind of learning is that because learners can design their won experiments in the domain and infer the rules of the domain themselves they are actually constructing their knowledge. Because of these constructive activities, it is assumed they will understand the domain at a higher level.*"

1.2.2. The levels of discoverable acts

- Level 1: Guided discovery learning. Problems and answers are given by teacher, solutions are explained by students.

- Level 2: Modified discovery learning. Problems are given by teacher, students find out their solutions.

- Level 3: Free discovery learning. Problems and answers are discovered by students.

1.2.3. The process, principles and characteristics of discovery learning

1.2.3.1. The process of discovery learning

The process of discovery learning includes 5 steps called the process of 5E Engage; Explore; Explain; Elaborate; Evaluation.

1.2.3.2. 5 principles of discovery learning

According to Jerome Bruner, discovery learning includes 5 principles:

Principle 1: Problem solving
Principle 2: Learner management
Principle 3: Connecting
Principle 4: Information analysis and Interpretation
Principle 5: Failure and feedback

1.2.3.3. The strong points and weak points of discovery learning

Strong points:

- Discovery learning supports an active engagement of the learner in the learning process, while you are participating, you are paying more attention

- Discovery learning fosters curiosity
- Discovery learning enables the development of life long learning skills
- Discovery learning personalizes the learning experience
- Discovery learning builds on learner's prior knowledge and understanding
- Discovery learning uses activities that focus your attention on the key ideas or techniques that are being examined.
- Discovery learning creates active involvement that forces you to construct a response and this results in processing of information deeper than mere memorization
- Discovery learning provides the student with an opportunity to get early feedback on their understanding
- Discovery learning results in "episodic memory," a deeper type of memory that allows you to connect information to events which creates stimuli for remembering the information.
- Discovery learning can be motivating, it incorporates the individuals pleasure of successfully solving problems and recalling information

Weak points:
- Discovery learning has the potential to confuse learner's if no initial framework is available
- Discovery learning has limitations in practice when schools try to make it the main way students learn academic lessons.
- Discovery learning is inefficient, it is too time consuming for all academic activities (for example mathematical operations), there are not enough hours in a school year for students to 'unearth' everything on their own.
- Discovery learning requires that the teacher be prepared for too many corrections, a lot of things one discovers for themselves turn out to be wrong (process of trial and error)
- Discovery learning can become a vehicle to reject the idea that there are important skills and information that all children should learn
- If discovery learning is taken as an overriding education theory it is apt to produce an inadequate education -

1.2.3.4. The discoverable acts for students
Act 1. Finding out the expressions of a given concept. Finding out the strong points and weak points of each expression.

Act 2. Proposing the hypothesis and characteristics of objects through the identification, observation, estimation, measurement, comparison, prediction, ect on many different cases of property, theorem and corollary. Finding out many different solutions to express the multiform and rich features of property, theorem and corollary. Clarifying the proofs that textbook does not give.

Act 3. Transforming the expression of problem to the equivalent form in order to find out the logical relationship between objects. From that, it is easy to find out the solution of problem.

Act 4. Analyzing, assessing the solution of problem. Transforming from complex to simple solution.

Act 5. Applying the existing knowledge, combining with knowledge and relating the non-existent thing to the existing thing in order to solve problem.

Act 6. Finding out the new mathematical results through the familiar thoughts such as, generalization, particularization, similarity, finding out the converse problem.

Act 7. Stating the practical problem of mathematical problem and modeling mathematically of real problems.

1.2.3.5. The organization of discoverable acts of teacher
Act 1. Teacher finds out about the existing knowledge, the learning need of students, defines new knowledgeable contents, new problems which students have to

learn. Teacher gives good problems on pedagogy. If there are many problems in a lesson then teacher needs to define the focused problems. We usually apply discovery learning to solve small problems, thus, the choosing of problem is the important factor that ensures the successfulness of discovery learning.

Act 2. Teacher motivates students to exchange difficult problems, communicate with together in order to find out the best thing of each problem. Teacher allows students to argue with him. Teach motivates students to develop critical thought, to give the converse of the point of view.

Act 3. Teacher follows the questions, feedback of students in order to learn from experience on pedagogy as well as give the assessment and correct, exact and objective ideas on the feedback of students. Teacher can change the contents of question in order to be suitable with learning acts.

Act 4. Teacher is skilful at placing students in the situations which cause the conflict of the awareness of students, spends a lot of time to discuss with together, adjust the incorrect awareness on the given problem.

Act 5. Teacher will spend time in order to students give the relationship and create the mind map when students learn new knowledge. If possible, teacher instructs the using of mind map to help students to memorize knowledge.

Act 6. Teacher instructs students to discover, adjust, control the discoverable attempts of students. Teacher orients necessary specific discoveries of students in the process of solving problem; such as the analytic, synthetic, compared, abstract, generalized and predictive acts, ect. In addition, teacher motivates students to study, research and create by themselves.

Act 7. Teacher usually uses the active methods to help students to get optimal discovery.

Act 8. Teacher uses visual media for discovery learning. The visual media can be images, charts, diagrams, models ect. The visual media will stimulate the observation, study, creation and argument of students. This is the important factor that ensures the successfulness of discovery learning.

Act 9. Teacher creates the environment that students assess by themselves, from that, each of students adjusts his learning acts.

1.2.4. *The organization of a lesson according to the orientation of discovery for students*

1. *The initial test (May be yes or may be no)*
2. *The initial situation to be in doubt (Yes)*

Teacher gives the initial situation to be in doubt, creates the conflict between the existing knowledge and new knowledge in order to take sharp new knowledge for students. If students need to solve problems then students adjust, complete their knowledge.

3. *The organization of discoverable acts for students to find out new knowledge (Yes)*

Students find out and analyze the situations to be in doubt together. Students interact with together and with teacher to exchange, confirm and check the information. In the process of discussion, there must be individual proposal, there must be appendix on the related knowledge in order to get more deep knowledge on the given problem. Students need to give their ideas on new knowledge and test new hypotheses. Students give individual ideas and questions to the given knowledge. Students discuss with together according to group form. Students give questions and answer together. Next, teacher adjusts the knowledge on concepts, theorems, rules, methods and affirms the knowledge that needs to be learnt, gives the nature of these concepts, theorems, properties, rules and methods. Students classify and give the differences between the methods of solving problems as well as give their mistakes in

the process of learning. Teacher consolidates knowledge and embeds knowledge for students, gives exercises to students, emphasize the skills that students need to be learnt. After that, students learn with advanced exercises, open ended problems that are problems having many solutions and similar, extended and generalized problems. This thing helps students to practice their independent and creative thoughts.

1.3. Applying ICT and media in teaching and learning mathematics at upper secondary school

1.3.1. Applying ICT and media to innovate the system of teaching methods deeply

According to Puskalo, applying ICT and media make the process of teaching and learning changeable. The system of teaching methods includes the following factors: teaching target, contents, methods, forms and media. The changing of a factor of the system of teaching methods makes the other factors changeable.

1.3.2. The organization of discoverable acts for students in teaching mathematics with the help of ICT

1.3.2.1. The organization of discoverable acts for students in teaching mathematics with the help of ICT without using the Internet

The discoverable acts in teaching mathematics with the help of ICT and media without using the Internet are usually discoverable acts with the help of mathematical software.

1.3.2.2. The organization of discoverable acts for students in teaching mathematics with the help of ICT using the Internet

The discoverable acts in teaching mathematics with the help of ICT and media using the Internet are usually discoverable acts with the help of e-learning, m-learning, e-book, WebQuest.

1.4. Some problems on e-textbooks

1.4.1. The concepts on textbooks

By Roger Seguin, Textbooks are an instructional aid in the teaching-learning process and must correspond to curricula so far as objectives, content and methodology of instruction of each subject are concerned. A textbook usually corresponds to the syllabus of a discipline, the objectives of which can serve as titles or sub-titles of different chapters of the book. In some cases the outline of the textbook is based on these objectives, but the titles of chapters or sub-chapters do not necessarily correspond to the content of the discipline as it stands in the curriculum. The content of the book is, in any case, much richer in order to provide the quantity of information, explanation, and comment needed to go deeper into the discipline.

The research of Quang-Bao Dinh, Duc-Tuan Tran, Ngoc-Thong Do, Thanh-Tam Pham supposes that, the requests of textbooks are as follows:

1. Textbooks need to conform to the rules of program

2. Textbooks need to help the development of common competencies and the specific competencies of subject.

3. Textbooks need to help the innovation of methods, to help self-learning acts, to help the corporative learning for students.

4. Textbooks grasp integrated and divided viewpoints thoroughly

5. Textbooks need to help the assessment according to the orientation of developing competence

6. Textbooks are suitable with their forms

7. Textbooks can have indexes pointed out other documents

According to the dissertation, textbooks are documents for students. Textbooks must cover the whole program from the target to the contents defined by program, must ensure the requests on the standard of knowledge, skills, methods, tests as well as the help of assessment and self-assessment according to the spirit of competent assessment, that are thinking mathematically, modelling mathematically,

comunicating in, with and about mathematics, corporating mathematically, posing and solving mathematical problems, making use of aids and tools.

1.4.1.2. The classification of textbooks

Textbooks are classified by the objects of using (according to levels) or classified by the titles of textbooks (algebraic, analytic, geometric textbooks).

1.4.2. The concepts on e-textbooks

E-textbooks are the software of textbooks ensuring the requests of paper textbooks, however, e-textbooks can exist independently and their contents cover whole program. E-textbooks must have electronic features, interactive features and feedback.

(i) Electronic features are as follows: E-textbooks can act on the Internet or without the Internet. We can see the contents of e-textbooks on personal computers (PCs, laptops), e-readers (Kindle, Nook, Sony, Reader, etc.), tablet computers (Multiform: iPad, Android Tablets (Galaxy Tab, Kindle Fire, etc.), Surface; Specialized: Kno, Class-book) or smart-phones. E-textbooks can integrate many kinds of the advanced and modern technology of informatics and media in order to serve information transmitting, learning, and studying best.

(ii) Interactive feature and feedback are as follows: e-textbooks ensure the converse relations, have dialogues or have impacts between e-textbooks and users. For example, when a student choose a wrong option on computer then he intermediately gets a message from e-textbooks on what his errors, knowledge and skills are and the instruction of next learning act for him in aiding discovery learning.

1.4.3. The characteristics of e-textbook

- *The first,* because e-textbook is the software of textbook ensuring the requests of paper textbooks, it structure is similar to paper textbook.

- *The second*, e-textbook helps teaching and learning, can create and maintain the interactive environment.

- *The third,* e-textbook must contain the system of clear and exact syntonies. The syntonies are displayed in the designing of its structure. Concretely, the structure of its contents is step by step, there are divided structure, hyperlinks and feedback, ect.

- *The fourth*, e-textbook is accompanied by e-readers. That 's reason why we focus not only on the transmittable contents but also e-readers.

- *The fifth*, e-textbook can integrate all kinds of advanced and modern ICT and media

1.4.4. The classification of e-textbook

Basing on the contents of containable and interactive abilities, we have:

1. Static e-textbook; 2. Animated e-textbook that can change its contents; 3. Animated e-textbook can not change its contents; 4. Interactive e-textbook.

Basing on the abilities of interference in e-textbooks, we have: 1. Close e-textbook; 2. open e-textbook.

Basing on the functional viewpoint, we have: 1. E-textbook helps teacher; 2. e-textbook helps students; 3. e-textbook helps teacher and students.

Basing on the distributive viewpoint, E-textbook are distributed by two forms: 1. CD-ROM; 2. Internet.

1.4.5. The structure of e-textbook

1. Title of e-textbook; 2. Contents of e-textbook; 3. hyperlinks and hypertexts; 4. Interactive environment.

1.4.6. The role of teacher and students in teaching with e-textbook

1.4.6.1. The role of students in teaching with e-textbook

Students will play a role both in the activeness and in the passiveness when they learn with e-textbook. Students discover and learn not only knowledge according to the given intension but also freedom depending on each strong points of them.

1.4.6.2. The role of teacher in teaching with e-textbook

There are many teachers to teach and discuss on a lesson in teaching with e-textbook. This participation will help the process of teaching improvable. This thing make the role of teacher more large and lively. Teacher now plays the part of instructor, fellow-learner, advisor, researcher, verifier, evaluator, ect.

1.4.7. The process of designing e-textbook

We propose the process of designing e-textbook through the research of designing and building an e-textbook at the given address http://e-edvietnam.edu.vn as follows:

Step 1. Researching program; Step 2. Designing e-textbook according to the organized orientation of discoverable acts; Step 3. Building e-textbook; Step 4. Giving e-textbook a trial run; Step 5. Verifying and completing.

1.4.8. The ability of using e-textbook to help the discoverable acts of students

The ability of using e-textbook to help the discoverable acts of students includes the following factors:

- E-textbook helps the building of system of questions around given problems through discussion or students by themselves;

- E-textbook helps students to approach, survey problems and collect data;

- E-textbook helps students to solve problems by doing according to small group or individuals;

- Students exploit and develop the obtained problem, perform scientific thoughts.

Students will continue to discover with teacher and their friends after the period "self-discovery" happens. Then the levels of discovery are deeply, systematically, and highly.

1.4.9. Possible restrictions when using e-textbook

1.4.9.1. On the learners

- Learners must be independent, high self-aware and can do in group, can online corporate and communicate with teacher and individuals.

- Learners must work out their plans suitable with them by themselves, learners themselves orient in learning, perform given plans well.

1.4.9.2. On the leaning contents

- E-textbook is not good for "handheld" professions as painting, music, dancing, medicine, gymnastics, manufacturing, ect. Although e-textbook can transmit images, sound and words to the Internet, the techniques which require direct contact such as musical instrument techniques, painting techniques, dancing techniques, ect are better when teacher teaches learners directly. We now need to combine the traditional teaching with teaching using e-textbook.

- We should not give the contents that are too abstract and complex in teaching with the help of e-textbook. Especially, the contents are concerned with experiment and practice that e-textbook can not perform or do not perform effectively.

1.4.9.3. On the technology

- Because e-textbook uses advanced and modern ICT and media, users and admin must have good and deep informatic techniques to use the functions of e-textbook skillfully.

- If there are breakdowns on electronic, computer or the Internet network, then learning using e-textbook can not happen or is difficult to happen.

1.5. The reasons of choosing the transformations on the plane in designing and using e-textbook according to the organized orientation of discoverable acts at upper secondary school

1.5.1. The transformations in designing e-textbook

The transformations on the plane is a part of geometry to research on the relations and properties of geometric plane. The transformations on the plane are given by (paper) textbook at upper secondary school.

We can design e-textbook according to the organized orientation of discoverable acts of the transformations.

1.5.2. The learning acts of the transformations

According to Shaughnessy, the learning acts of the transformations of students are as follows: 1. *Identifiable acts* ; 2. *Analytic acts* ; 3. *Usable acts*

1.6. The pedagogic requests for e-textbook to help the transformations on the plane according to the organized orientation of discoverable acts for students at upper secondary school

1.6.1. The common pedagogic requests for e-textbook to help teaching at upper secondary school

The first, e-textbook ensures the common pedagogic requests to help teaching at upper secondary school, The contents of e-textbook are pedagogic, easy to learn, the second, the functions of e-textbook are convenient for users. The functions are displayed as follows:

1. The function of dividing pages; 2. Hypertext and hyperlink function; 3. medial function; 4. Stored function; 5. Animated; 6. Interactive function.

1.6.2. The pedagogic requests for e-textbook to help the transformations on the plane according to the organized orientation of discoverable acts

1. Organized orientation; 2. Divided orientation; 3. Verifiable function; 4. The function of helping students in learning; 5. Corporate function; 6. Concerned knowledgeable Reference; 7. Interactive function; 8. Advantageous access; 9. The tests and feedback of learners; 10. Saving learning traces; 11. Experimental function.

1.6.3. Using e-textbook in teaching mathematics

Teaching mathematics with the help of e-textbook is usually the blended learning form. Students are given by self-learning tasks at home. Teaching in class will be communicative after students finish the self-learning tasks at home given by teacher. Teacher gives questions and examples to embed the knowledge that students learn by themselves. Students give their questions in order to teacher answers these ones. The questions can be the questions on the self-learning of knowledge, the nature of concepts, rules, methods and solving problems. However, the questions may be the skills of using e-textbook. Teacher acquires, listens to and answers all of questions of students. After that, teacher assert all of knowledge that students need to master this one. Teacher gives the next self-learning tasks at home to students.

1.7. The reality on using e-textbook in teaching the transformations on the plane at upper secondary school

1.7.1. The situation of developing and using e-textbook in the world

There are many countries interested in researching and designing e-textbook especially in the world. There is the math tech book *Discovery Education* designed according to the discoverable orientation in USA. There is the interactive book *Ambook* in Singapore. However these books do not have the divided function of students, online learning, screen sharing, PowerPoint Sharing. They do not the function of dividing pages to discover the knowledge from the revelation of a little information to the revelation of much information (the levels are equivalent from good students to bad students). They do not have the automatic function, learning

record and saving traces of students. They will not have the tree-table of four choices announcing the correct and incorrect choice after they have finished the lesson.

1.7.2. The developing and using e-textbook in Vietnam

There are many e-books published in CD-ROM forms. The school technology and informatics company gives a series of geometric e-books from grade 6th to 12th; The pupil and student software company gives the series of e-textbooks "To learn good maths" from grade 10th to 12th. The characteristics of these e-books are beautiful in colors, eye-catching in images. However, there is not any e-book that its contents refer to the transformations. These e-books have interactive ability however they do not divide students, they do not help students to self-learn as well as do not have online learning function. Their contents are focused on the statement of knowledge and methods again, they do not create the active environment for the objects of the transformations on the plane, They do not tools to help the prediction of results, assessment, finding out new problems. Especially, there is not any e-book designing lesson according to the organized orientation of discoverable acts.

If e-book is published by e-reader than there only is the *Classbook* of the Vietnam Education Publishing House. *Strong points*: *Classbook* obtains all of subjects that students must learn at upper secondary school. Students can note and do exercises on its pages. Classbook inputs multimedia data such as video clip, sound, images, audio. If students do tests then they get the correct or incorrect feedback intermediately. The *Classbook* are especially good for English subject. If students click and press on an English word then *Classbook* displays its meaning contents intermediately. There is pronunciation of each English words. For another subject such as literature, *Classbook* also broadcasts the short films on literature works made into films such as *Chi Pheo*. For musical subject, *Classbook* broadcasts songs as well as the biography and career of musicians. *Weak points*: The contents of some subjects such as mathematics are static. There is not interactive with figures, it does not allow users to move figure, test the results of problems. It does not allow to perform the divided teaching, does not to teach according to the organized orientation of discoverable acts as well as does not have online testing function. The e-textbook *Classbook* do not permit teaching by online form.

The conclusion of chapter 1

In chapter 1, The dissertation systematized some point of views of some authors on the innovation of teaching methods as well as referred to some problems on discovery learning. Discovery learning is one of active methods for students. This viewpoint helps students to build knowledge by themselves. Students always force to send their feedback and the feedback of the informational processable process will become more deeply than normal memorization.

Applying ICT and media will change the process of teaching and learning. The system of teaching methods includes the following factors: teaching target, contents, methods, forms, media and tests, assessment. The changing of a factor of the system of teaching methods makes the other factors changeable. Beginning from textbook, e-textbook is one of teaching medium. E-textbook helps students to learn and discover by themselves.

All existing e-textbooks in our country and in the world now do not adapt to the pedagogic requests such as the function of dividing students, the function of helping students to learn, discover by themselves, ensure the converse of relation and ensure the interaction and feedback. For examples, some famous e-textbooks such as **Discovery Education** of USA, *Ambook* of Singapore, *Classbook* of our Education Publishing House do not ensure the pedagogic requests. That 's reason why, we researched on the designing and building the e-textbook ensuring these pedagogic requests. The concrete contents are referred in the chapter 2.

Chapter 2
THE RESEARCH OF DESIGNING AND USING E-TEXTBOOOKS IN TEACHING THE TRANSFORMATIONS ON A PLANE ACCORDING TO THE ORGANIZED ORIENTATION OF DISCOVERABLE ACTS

2.1. The general of planar geometric program at upper secondary school

The transformations on the plane at upper secondary school must conform to the standard of mathematical knowledge and skills. The standard of knowledge and skills are conceptualized in the text and program in 2006 as follows:

On knowledge: Students need to memorize, master and know the knowledge of program and textbook thoroughly, that are stable bases to develop the aware competencies at high level.

On the skills: Students know to apply knowledge to answer questions, to solve problems, to do practical exercises, to calculate, to draw figures, to draw charts, ect.

On the knowledge and skills Students must base on the basis of developing the competence and intelligence of students from simple level to complex level; Contents include all of different levels of awareness.

2.2. The rules of designing e-textbook to help teaching the transformations on the plane according to the organized orientation of discoverable acts

2.2.1. Designing e-textbook ensures the standard of knowledge and skills

Designing e-textbook ensures the standard of knowledge and skills. Concretely, teaching with the help of e-textbook must ensure the basic and minimum requests on knowledge and skills, ensure that its contents is not too heavy and it is not absolutely dependent on textbook; it ensures the levels of exploiting deep knowledge and skills in textbook, ensure that it is suitable with students' abilities. Teaching with the help of e-textbook must prove the learning enthusiasm, self-awareness and initiative of students.

2.2.2. Ensuring the flexible feature, high updated ability, open feature, creating the ability relative to other documents in designing e-textbook to help the transformations on the plane

The flexible feature shows as follows, each of functions, tools of e-textbook can adapt to all of needs of users now and in future.

E-textbook is designed to make changing, adding and removing data advantageous and easy. Open feature shows as follow, e-textbook is not a close one (it means, the data source as well as the designing technology are not changeable). E-textbook allows users to share images, sound, videos, PowerPoint, MP3, ect easily.

E-textbook can concern with other existing documents on the Internet. That are pages of e-textbook or websites on other e-textbooks, websites on blended learning to serve the process of teaching better.

2.2.3. Ensuring high interaction, combining with many interactive forms in designing e-textbook to help the transformations on the plane according to the organized orientation of discoverable acts, creating the environment for the experience of students

High interactions of e-textbook are the ones between users and computers, between users. The interactions are as follows:

1. Oriented interaction; 2. Functional interaction; 3. medial interaction; 4. direct interaction; 5. Animated interaction; 6. The interaction of feedback; 7. The interaction of saving traces; 8. Late interaction

2.2.4. Ensuring the ability of saving results performed the process of learning with the help of e-textbook of students

If there is not a record saving the results of students' acts then students do not know what they do when they access e-textbook. This thing is easy to make the access coincident with the access before or is easy to forget the access that needs to be

accessed. Thus, if there is not a record then the access of e-textbook of students will not be effective.

2.2.5. Ensuring the divided requests with the ramified level suitable with students at upper secondary school

The function of adapting divided teaching with the ramified level is the function *Divided Exercises* of *E-notebook*. Students do exercises that their solutions are divided into knowledge doses. The average of a solution is usually divided into from three to four doses. Each of doses is usually divided into four correct-incorrect choices. The question of correct-incorrect choices is average in level. Rather good and good students will choose choices correctly and fast. Bad students will choose incorrect choices. When students choose incorrect choices, e-textbook will give the instructions intermediately to help students to master knowledge, practice skills. When students choose correct choices then e-textbook will give the next question. After students finish all correct choices then e-textbook will give the tree-table of four choices announcing the correct and incorrect choices or students can see their correct and incorrect choices on the statistical table

2.2.6. Providing timely feedback, ensuring the oriented ability for teacher and students, making students friendly when teaching with e-textbook

Learning acts can be divided into two types for designing online acts of students. The first, teacher predicts the contents of students' answers and thus, teacher can give controlled and oriented structures. We can call this feedback by intermediate one.

The second, we call it by the late feedback. Teacher decides the contents as well as the forms of feedback for the late one. Teacher bases mainly on his experience. When teacher designs the pedagogic script for e-textbook and masters the pedagogic idea of lesson then the feedback will be timelier and more suitable.

2.3. Building e-textbook to help teaching the transformations on the plane according to the organized orientation of discoverable acts

2.3.1. The process of building planar geometric e-textbook

Step 1. Collecting information on the functions and required requests of e-textbook of the transformations on the plane and helping teaching the transformations on the plane according to the organized orientation of discoverable acts

Step 2. Analyzing the contents of the transformation on the plane (textbook) to define the required requests of e-textbook according the organized orientation of discoverable acts

Step 3. Designing e-textbook of the transformations on the plane according to the organized orientation of discoverable acts

Step 4. Building e-textbook of the transformations on the plane according to the organized orientation of discoverable acts

Step 5. Giving e-textbook of the transformations on the plane a trial run

Step 6. Testing and taking over e-textbook on the transformations on the plane according to the organized orientation of discoverable acts

2.3.2. The structure of e-textbook of the transformations on the plane

1. The title of e-textbook of the transformations on the plane; 2. E-forum; 3. E-dictionary of the transformations on the plane; 4. E-testing of the transformations on the plane; 5. E-documents of the transformations on the plane; 6. Forum on the transformations on the plane; 7. Instructions; 8. Introduction; 9. Contact; 10. Entertainment; 11. E-notebook of the transformations on the plane; 12. E-rough notebook of the transformations on the plane; 13. Self-learning tasks of the transformation on the plane; 14. E-learning record of the transformations on the plane; 15. Login, changing password, information;

2.3.3. Database of e-textbook

The database of e-textbook are stored in E-notebook, E-testing, Self-learning tasks, E-dictionary and E-documents.

2.3.4. The function helping teaching the transformations on the plane according to the organized orientation of discoverable acts of e-textbook

- *E-notebook:* Containing contents, knowledge on the transformations to serve the learning, researching and referring of students according to the organization of discovery learning

- *E-forum:* The exchange and feedback of information of students and teacher are very necessary in the process of discovery learning. E-forum allows users to exchange information, images, lesson slides, video files as well as to decentralize to teacher interfering in the screen of students' computers.

- E-dictionary: When students learn a certain concept by discovery learning, students have a need to look up information, for example, students learn the homothety that they want to look up the word: "the transformations" then function of e-dictionary will allow him to look up the concerned knowledge of this word

- E-testing: After students finish the lesson according to discovery learning, there will must be a test to check all of the process of learning.

- E-documents: E-documents are the function which students exchange documents together as well as download documents given by teacher. Documents are files .doc, .pdf having small capacity, being popular to serve teaching and learning the transformations on the plane well.

- Forum: Forum creates a static forum, allows students to communicate with students, teacher communicates with students, parents of students communicate with students, parents of students communicate with teacher and the representative of upper secondary school, ect.

- Entertainment: Entertainment allows users to play games on intelligence.

- Self-learning tasks: Self-learning tasks are designed for each of students. Students do exercises suitable with their competencies by themselves.

- E-learning record: E-learning record saves all of the process of e-textbook functional access of students.

2.3.5. Links to outer documents

Documents on the Internet are rich on contents, multiform in forms. Documents create an environment, equal opportunities for the learning of every users and adapt to their multiform needs. E-Documents are online ones that do not restrict by space and time. Outer documents allow teacher to organize the teaching acts according to discoverable method advantageously and easily. The linked function of outer documents is hyperlink.

2.4. The use of e-textbook to help teaching and learning plane geometry according to the organization of discovery learning acts

2.4.1. The process of teaching and learning a lesson on e-textbook according to the organized orientation of discovery learning acts

The process of learning a lesson on e-textbook according to the organized orientation of discoverable acts includes the following stages:

- Teacher gives home tasks to students (in the previous lesson in class)
- Student learns with e-textbook by himself
- Students learn in class (after students have learned the lesson in the e-textbook)
- Teacher gives home tasks to students (in the next learning period)

The following is an example which illustrates the teaching according to the organized orientation of discoverable acts of "the reflectional symmetry":

2.4.1.1. Teacher gives home tasks to students (in the previous lesson in class)

The previous lesson in class is "The translation and transformations", teacher

gives home tasks to students before finishing the lesson: You learn the relectional symmetry, the symmetric axis of a figure, read illustrated examples and do the ramified problem of §3. The reflectional symmetry on e-textbook by yourselves. After you finish learning "the reflectional symmetry" with the help of e-textbook, you will fill in the following notes:

- What is the reflectional symmetry?
- Do you give an example on the axis of a figure in the real life?

Students write their answers on the notes and submit them to teacher in the next lesson in class.

Students access the pages of e-textbook to learn "the reflectional symmetry" by themselves at home .

2.4.1.2. Student learns with e-textbook by himself

- Students access the function E-notebook $\rightarrow$ Advanced geometry of grade 11th $\rightarrow$ Chapter 1. §3. The reflectional symmetry $\rightarrow A$. Theory $\rightarrow 1$. Definition of the reflectional symmetry, read contents, interact with figures and observe the feedback from computer and answer the discoverable acts of examples 1, 2, 3, 4.

After students finish the examples, e-textbook gives the question: Observe the figures of the examples 1, 2, 3, 4 above, give the common features on them?

- Given line a, with each of points M, we only definite a point M' symmetric to point M with respect to a.
- Students gives the definition of the reflectional symmetry.
- Students access the function E-notebook $\rightarrow$ Advanced geometry of grade 11th $\rightarrow$ Chapter 1. §3. The reflectional symmetry $\rightarrow A$. Theory $\rightarrow 3$. The symmetric axis of a figure, read and discover the examples 1, 2. Answer the questions given by e-textbook.
- Students access the function E-notebook $\rightarrow$ Advanced geometry of grade 11th $\rightarrow$ Chapter 1. §3. The reflectional symmetry $\rightarrow C$. The divided exercises, do the divided exercises. The divided chart of four choices are as follows
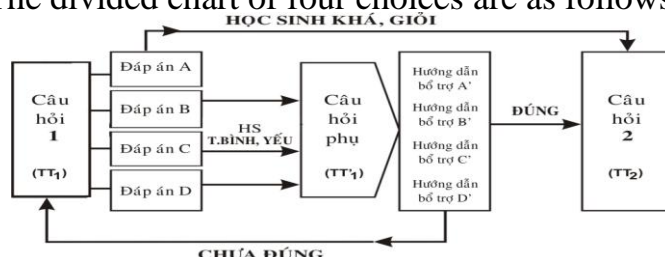

Chart 2.1. The divided chart of four choices of a question

Students discover freely without the interference of teacher. This thing helps students to improve their inferiority complex because the communication between users and computer is friendly and personal absolutely. Doing divided exercises helps e-textbook to classify students fast and advantageously. Rather good and good astudents will choose correct and fast choices ; meantime, bad and avarage students need the instructions. For example, if a student choose an incorrect choice and presses on **Lưu & Chuyển Câu Tiếp Theo** then e-textbook equipped with artificial intelligence gives the feedack intermediately. The feedback allows student to know what his wrong and skills are?

When students learn, the main results will save in E-learning record of students automatically. Teacher can test the process of students' learning. Finally, teacher will catch the situations of students' learning before they learn next period in class (if students do not learn then they will be warned).

2.4.1.3. Students learn in class (after students have learned the lesson in the e-textbook)

Teacher asks students to answer the given questions at the previous lesson. All of students discuss these questions, teacher answer these ones of students. There are a lot of different methods in order to organize the acts in class. Teacher can organize the common learning acts for all of students or for groups or each of individuals.

The acts of teacher in class are:

- To stabilize the class.

- Act 1: Teacher receives the replies of students, answer students' questions and organize the common acts for class by the questions of testing students' knowledge fast.

- Act 2: Teacher organizes the acts for groups of students.

- Act 3: Teacher sends private notes to students.

- Act 4: Teacher asserts the main knowledge that needs to be learned.

- Act 5: Teacher give home tasks to students (in the next learning period)

(The type of discovery learning in class is the guided one.)

2.4.1.4. Teacher gives home tasks to students (in the next learning period)

Teacher gives the same home tasks to students (in the next learning period) as the home tasks to students (in the previous learning period). Concretely, teacher gives home tasks to students in the next learning period in class; students do the exercises of textbook, find out more different solutions and generalized problems. Students access the address given by teacher at home and do according to teacher's requests. When students learn with e-textbook by themselves, students do not understand or have any questions, then students will ask teacher in the next learning period, teacher will explain and answer the questions.

Teacher gives home tasks to students; students consolidate knowledge, do problems of developing thought. Students learn the next learning period on e-textbook by themselves.

The illustrated example that teacher gives home task to students (at the next learning period of lesson "the reflectional symmetry (period 2)") is as follows

- Homework: Exercises 7, 8 (page 13 –E-textbook).

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- Teacher consolidates, broadens knowledge and gives the advanced and development problems of creative thought to students. For example, these are the problems of reflectional symmetry having many solutions; similar and generalized problems of the origin one.

- Teacher gives home tasks to students on the remaining lesson of the reflectional symmetry on e-textbook. After students themselves finish the period 2 of the lesson "the reflectional symmetry" at home, students will answer two following questions of teacher:

- Is the reflectional symmetry an isometry?

- Give your statements on the coordinate expression of a reflectional symmetry across Ox -axis?

Students note on paper and give their answers to teacher in the next learning period.

2.4.2. *The process of learning a lesson on e-textbook according to the organized orientation of discoverable acts without the learning step in class*

The process of learning a lesson on e-textbook according to the organized orientation of discoverable acts without the learning step in class includes the following steps

a) *Using e-textbook to help discovery acts*

b) *Using e-textbook to help students learn by themselves*

c) *Using e-textbook to help corporate acts*

d) *The method of learning with e-textbook*

e) *The method of interaction with e-textbook*

f) *The results of doing tests of students*

Because of some private reasons that a student misses a certain lesson, the effectiveness of self-learning is not good as the blended learning combining online technology with classroom instruction; however, student can understand and apply basic knowledge. From that, e-textbook helps student continue to master the new knowledge more easily, more efficiently.

The conclusion of chapter 2

From the pedagogic requests for e-textbook in chapter 1 such as the dissertation ensures pedagogy in content requests, conforms to the standard of knowledge and skills, is easy to learn, its functions are advantageous for users; its design ensures the discoverable and divided orientation, it can self-learn and test, can be corporate with, can interact with, send feedback and can save learning traces of students, e-textbook needs to design and build functions to adapt these requests. The contents of the transformations on a plane show full of basic mathematical forms and they are also difficult in teaching at upper secondary school. However, we can design e-textbook of the transformations on the plane to help students to self-learn, self-study and self-discover.

The structure of e-textbook of the transformations on the plane to ensure the pedagogic requests given in the chapter 1 is as follows:

- There is E-notebook showed the content of the transformations on the plane according to the discoverable and divided orientation. Students observe knowledge, interact with knowledge, get feedback, study and find out knowledge. Students will be classified by many different learning capacity when they do divided exercises on the E-notebook. E-textbook helps each of students to think according to his level by himself because of divided learning. When student finish the divided exercises, e-textbook will give the tree-table of four choices and the divided chart of four choices.

- There is E-testing of the transformations on the plane.

- There is E-rough notebook to allow to test, predict results and create new problems, move figures.

- There is Self-learning tasks to help students to develop their strong points as well as reduce weak points

- There is E-forum, E-forum allows students to share information, images, lesson slides, video files as well as to decentralize to teacher interfering in the screen of students' computers. When students do not perform discoverable acts or perform discoverable acts without effectiveness then teacher will interfere in students' computer to instruct learning methods. E-forum allows students to learn online.

- There is E-dictionary; E-dictionary allows students to look up the meaning of a mathematical word.

- There is E-learning record; E-learning record saves the learning traces of students, helps teacher to know the process of students' self-learning.

The method of using e-textbook in teaching the transformations on the plane according to the organized orientation of discoverable acts includes the main stages as follows:

- Teacher gives home tasks to students (in the previous lesson in class)
- Student learns with e-textbook by himself
- Students learn in class (after students have learned the lesson in the e-textbook)
- Teacher gives home tasks to students (in the next learning period)

E-textbook helps students to study, discover knowledge and helps students to self-learn well. Teacher can use e-textbook to help teaching and students can use e-textbook to self-learn without teacher.

All of designing and building of e-textbook given by us need to test in the reality. Thus, we need the investigation, survey and experiment to consider that will students' learning become better when they learn with e-textbook? Qualitative, quantitative analysis and case study give the effectiveness of process of learning with the help of e-textbook. These contents are referred to the chapter 3.

Chapter 3
PEDAGOGIC EXPERIMENT
3.1. The purpose of pedagogic experiment

The pedagogic experiment aimed to test and assess the given e-textbook and to use this e-textbook according to the organized method of discoverable learning acts on the transformations on the plane given in chapter 2. Concretely:

- Testing and assessing the feasibility and the effectiveness of e-textbook.

- Testing and assessing e-textbook to help students to learn and discover knowledge.

- Testing and assessing the enthusiasm, interest and passion of learning acts with the help of e-textbook.

- Testing and assessing e-textbook to improve the learning quality of the transformations on the plane.

3.5. Experimental result

Experiment was carried out in only one time. Experiment and control classes are normal at upper secondary schools. We randomly choose two groups being experiment and control group for each of classes.

3.5.1. Experiment result (from 2014 - 2015)
Qualitative analysis:

For experiment group: We designed the process of learning according to blended learning. Teacher gave home tasks to students through e-textbook, students answered the questions given by teacher. There were given contents that were presented by each of students or by group in class. In addition, teacher also gave the common acts and delivered survey forms to each students' competencies suitably.

+ For the first lesson: "The beginning of transformations" and "The translations and transformations", teacher asked students to give their answers that students had finished the lesson before to him. Teacher carried out the organization of teaching acts according to discoverable orientation. Students were interested and active in the process of building new lesson because of the acts of study, discovery and instruction.

+ After finished the lesson "The translations and transformations", teacher asked students to do exercises as well as gave the notice on the knowledge that students had to learn in two next lessons of chapter "The isometry and similarity" at the same time.

Following four first periods of lessons "The beginning of transformations", "The translations and transformations", "The reflectional symmetry (the first period)", "The reflectional symmetry (the second period)", we see that students join in the acts required by teacher actively at the experiment time. If students learn with traditional methods then they are difficult in applying the transformations to concrete problems. Because knowledge of lesson is much, the time of learning with traditional methods is almost for receive new knowledge without practicality. However, since students study and learn with e-textbook by themselves, the time of mastering concepts and applying theory to exercises is much. In addition, exercises in e-textbook help students to practice by themselves and to be proficient in theory. The percentage of students that are active in finishing self-learning is increase gradually through each of experiment lessons and students are divided by e-textbook through the function *The divided Exercises*. We carry out to study learning record of 21 students through each of periods in four first learning periods in order to investigate the amount of students finishing lessons early, right or late in progress when students themselves learn with e-textbook for 37 students of grade 11A1 to participate in experiment. In addition, we also study the correct-incorrect choices of divided exercises saved in e-textbook to assess the time of choosing these choices of students. Concretely, the time of learning "The beginning of the transformations – The translations and isometry" is as follows:

There are 4 students to finish the lesson early and they make up 19,05%; 14 students to finish the lesson right and they make up 66,67%; 3 students finish the lesson late, they are warned by teacher through Forum, they must renew learning time and make up 14,28%. The time of learning "The translations and isometry (the second period)" is as follows: There are 7 students to finish the lesson early and they make up 33,33%; 12 students to finish the lesson right and they make up 57,14%; 2 students finish the lesson late, they are warned by teacher through Forum, they must renew learning time and make up 9,53%. The time of learning "The reflection symmetry (the first period)" is as follows: There are 10 students to finish the lesson early and they make up 47,62%; 10 students to finish the lesson right and they make up 47,62%; 1 student finishes the lesson late, they are warned by teacher through Forum, he must renew learning time and make up 4,76%. The time of learning "The reflectional symmetry (the second period)" There are 16 students to finish the lesson early and they make up 76,19%; 5 students to finish the lesson right and they make up 23,81%; there is nobody to be warned or need to renew learning time. Teach realizes through doing divided exercises in e-textbook as follows: Rather good and good students choose choices exactly and correctly; some average students choose choices correctly however the time of average students is longer than rather and good students, the other average students choose choices that may be correct or incorrect. Bad students choose choices for a long time and their incorrect choices are more than the incorrect choices of average students.
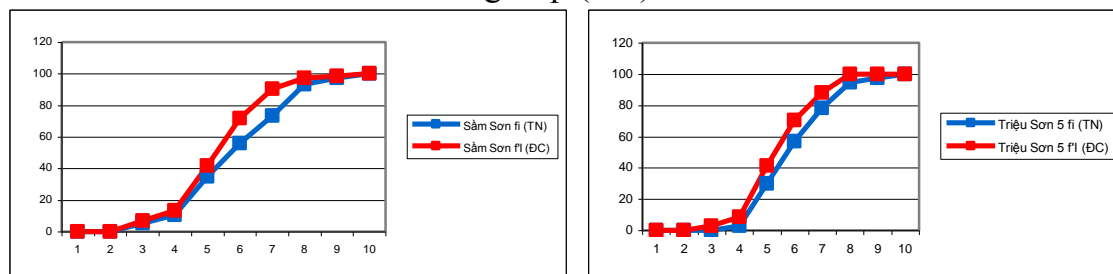
For control group:

The periods happen normally, teacher applies some active methods however this is the lesson on "The isometry and the similarity" in the plane, it is too abstract, it has many difficult formulas, thus, students are difficult in acquiring and applying them to solve problems. There are many students not focused on the lesson of teacher, some students can not answer the questions through ours observation.

- On the quantitative analysis:

We had organized pedagogic experiment about a month with teaching students directly, combining instructing students to learn the knowledge of chapter The isometry and similarity on the plane through doing exercises, tests and learning with given e-documents on e-textbook. We carried out to give tests to both of experiment group and control group at the end of the experiment time. The tests are marked and processed by statistical theory.

Chart 3.3. The frequency graph of convergence of experiment group (TN) and control group (ĐC)

The frequency graph of convergence of experiment group is the right side of the frequency graph of convergence of control group. This thing shows that the learning quality of experiment group is higher than the learning quality of control group.

We carry out to process the mathematical statistical data in order to assert the quality of the experiment time, the results are as follow:

Using the statistical method with students' t distribution to consider the effectiveness of pedagogic experiment, we have the following results:

$t = 1,97 > 1,67 = t_\alpha$ for Sam Son upper secondary school.

$t = 2,18 > 1,69 = t_\alpha$ for Trieu Son 5 upper secondary school.

$t = 1,82 > 1,67 = t_\alpha$ for Duc Trong upper secondary school.

Thus, the experiment time at the three schools is effective.

- Hypothesis testing of E_0:

$F = 1,36 < 1,53 = F_\alpha$ for Sam Son upper secondary school.

$F = 1,20 < 1,84 = F_\alpha$ for Trieu Son 5 upper secondary school.

$F = 1,07 < 1,53 = F_\alpha$ for Duc Trong upper secondary school.

Three above cases give results accepted the hypothesis E_0, it means that the difference between the variance of experiment group and control group is meaningless at each of upper secondary schools.

- Hypothesis testing of H_0:

$t = 1,98 > 1,66 = t_\alpha$ for Sam Son upper secondary school.

$t = 1,71 > 1,67 = t_\alpha$ for Trieu Son 5 upper secondary school

$t = 2,14 > 1,66 = t_\alpha$ for Duc Trong upper secondary school

Since the above results, it states that the statistical results reject the hypothesis H_0. Thus, the difference between the variance of experiment group and control group is meaning. It shows that the results of experiment group are higher than the results of control group at the three upper secondary schools.

3.5.2. Following the progress of a small student group (Case study)
3.5.2.1. The result of model choice

(1) Vu Vuong An (username: vuongan) is a student of grade 11A1 of Samson upper secondary school, Thanh Hoa province.

Vu Vuong An is good at learning. He is good at mathematics, physics, chemistry, ect, and is bad at literature. He is talented at physics. Vuong An is nearsighted. He does not talk in class, he likes to join in class acts. The skills of mathematics such as geometric skill, solving problem skill, computational skill and using mathematical tool skill are good. The self-learning ability of Vuong An on e-textbook is good. The time of finishing the given requires of e-textbook of Vuong An is always at the top. After he finishes the self-learning, Vuong An will be quite good for catching the self-learning knowledge. Vuong An also helps the other friends, he often accesses the forum feature to help bad students. He usually asks teacher about difficult problems concerned with the self-learning on e-textbook.

(2) Le Quoc Hung (username: quochung) is a student of grade 11A1 of Samson upper secondary school, Thanh Hoa province.

Le Quoc Hung is quite good at learning. He is quite good at mathematics, is bad at literature and he is especially talented at chemistry. Hung is nearsighted. He does not talk in class, he likes to join in class acts. The skills of mathematics such as geometric skill, solving problem skill, computational skill and using mathematical tool skill are quite good. The self-learning ability of Quoc Hung on e-textbook is also good. The time of finishing the given requires of e-textbook of Quoc Hung is always at the top. The time that Quoc Hung finishes his self-learning is little longer than Vuong An. After Quoc Hung finishes the self-learning, Quoc Hung will be quite good for catching the self-learning knowledge. Quoc Hung also helps the other friends, he often access the forum feature to help bad students. He also asks teacher about difficult problems concerned with the self-learning on e-textbook.

(3) Le Van Tien Dzung (username: tiendung) is a student of grade 11A1 of Samson upper secondary school, Thanh Hoa province.

Le Van Tien Dzung is average at learning. He is not self-aware in learning, he only learn when teacher gives learning tasks to him. He does not talk in class, he likes to join in class acts. Dzung is quite good at chemistry, he is bad at literature and he is not talented. He is nearsighted. The skills of mathematics such as geometric skill, computational skill, compared skill is quite good and the skill of using ICT is good.

(4) Tran Tri Ngoc (username: tringoc) is a student of grade 11A1 of Samson upper secondary school, Thanh Hoa province.

Ngoc is bad at learning. Teacher even gives clear task to him, he is not self-aware in learning. He is especially bad at mathematics and he is not talented. He is not handicap. Ngoc is a special student. We ask teacher to help him learn and review lessons on our e-textbook. We also ask some rather good and good students to answer his questions on online. These things make him better. The self-learning ability of Ngoc of two first periods is bad. He usually chooses incorrect answers of ramified problems. The time that he finishes the given requests of e-textbook is the longest. The path of choosing answers in ramified problems is usually a zigzag. The time that Ngoc finishes the self-learning is less than An and Hung about 6 minutes.

3.5.2.2. The analysis of results

- Qualitative assessment:

(1) Vu Vuong An

At the first period *"The beginning of transformations"* and *"The translations and transformations"*, Vuong An finishes the self-learning quite long. At the next periods such as *"The translations and transformations"* (period 2), *"The reflectional symmetry"* (period 3, period 4), Vuong An finishes the self-learning fast.

(2) Le Quoc Hung

At the first period *"The beginning of transformations"* and *"the translations and transformations"*, The time that Quoc Hung finishes the self-learning is longer than Vuong An. At the next periods such as *"The translations and transformations"* (period 2), *"The reflectional symmetry"* (period 3, period 4), Quoc Hung finishes the self-learning fast.

(3) Le Van Tien Dzung

At the first period *"The beginning of transformations"* and *"the translations and transformations"*, The time that Tien Dzung finishes the self-learning is longer than Quoc Hung and Vuong An about 4 minutes. At the next periods such as *"The translations and transformations"* (period 2), *"The reflectional symmetry"* (period 3, period 4), Tien Dzung finishes the self-learning quite fast. The self-learning ability of Dzung is average.

(4) Tran Tri Ngoc

At the first period *"The beginning of transformations"* and *"the translations and transformations"*, Tri Ngoc does not master the self-learning knowledge. When he learn by himself, he does not know to communicate with his friends and teacher in order to get their help. Tri Ngoc chooses incorrect choices of divided exercises and need instructions.

- Quantitative assessment:

We follow the learning of 04 students by e-textbook, from the traces of the students on e-textbook, we realize that, students usually enter their login to learn knowledge, do exercises and tests, the following results of 04 students in a month are as follows

TT	Full name	Score time 1	Score time 2	Score time 3	Score time 4
1	Vương An	7.5	8.5	8.5	9.0
2	Quoc Hung	7.0	7.5	7.5	8.0
3	Tien Dzung	6.0	7.0	7.5	7.5
4	Tri Ngoc	4.5	5.0	5.0	6.0

The conclusion of chapter 3

If chapter 1 gives pedagogic requests, chapter 2 gives the designing and building e-textbook to ensure pedagogic requests then chapter 3 carries out the investigation, observation, statistics and case study to examine all of applied sides of e-textbook when students learn the transformations according to the organized orientation of discoverable acts in reality. Concretely:

- From the experiment survey in chapter 1; the designing and building e-textbook in chapter 2, the experiment in chapter 3 allows us to assert that: We absolutely can exploit e-textbook to help students to learn the transformation on the plane according to the discoverable acts with the conditions of students at upper secondary school now.

- From the experiment survey in chapter 1; the designing and building e-textbook in chapter 2, the experiment in chapter 3 allows us to assert that: The exploitation of applications of e-textbook helping students to learn the transformations on the plane is necessary, meaning in theory and meaning in reality.

- From the experiment survey in chapter 1; the designing and building e-textbook in chapter 2, the experiment in chapter 3 allows us to assert that: Basically, teacher and students have full skills of exploiting applications on e-textbook to help learning the transformations according to the organized orientation of discoverable act.

- From the designing and building e-textbook in chapter 2, the experiment in chapter 3 allows us to assert that: The contents of e-documents on the transformations in the plane given by the dissertation are absolutely suitable with the standard of knowledge and skills of advanced geometry of grade 11th. The structure of e-textbook helps students to choose the contents of learning the transformations on the plane according to the organized orientation of discoverable acts suitable with the competence of each student.

- From the rules of designing, building and carrying out learning a lesson on the transformations on the plane according to the organized orientation of discoverable acts on e-textbook in chapter 2, the experiment in chapter 3 allows us to assert that: The projects of learning the transformations on the plane according to the organized orientation of discoverable acts given by the dissertation are absolutely feasible and extended

- From the experiment results, we assert that: If we definite pedagogic requests to e-textbook, the process of designing e-textbook and using e-textbook according to the organized orientation of discoverable acts for students in teaching the transformations on the plane suitably then e-textbook make students active in the process of learning, e-textbook improves the quality of teaching the transformations on the plane of advanced geometry of grade 11th at upper secondary school

- From the case study, we assert that: All of students participating the experiment will be progressive in learning after they do each test

CONCLUSION

From the researched purpose and experiment of using e-textbook to improve the effectiveness of learning the transformations on the plane of grade 11th according to the organized orientation of discoverable acts, the dissertation obtains some initiative results, concretely:

On the theory:

- Systemizing the theories on discovery learning, improving the role of ICT and media in general and exploiting some the applications of e-textbook in particular in helping learning the transformations on the plane according to the organized orientation of discoverable acts.

- From the overview on learning model with e-textbook, the dissertation focuses on the clarifying of active factors of e-textbook in helping students to learn the transformations on the plane according to the organized orientation of discoverable acts as well as basic skills for teacher, students learn with e-textbook to propose the model of e-textbook with functions suitable with helping learning geometry according to discoverable orientation of students.

- Contributing the clarifying of some concepts: Discovery learning, textbook, e-textbook to propose requests, rules of designing and building e-textbook to exploit some applications of e-textbook to help students to learn the transformations on the plane according to the organized orientation of discoverable acts

- Proposing concrete pedagogic requests to organize students to exploit some applications of e-textbook in the process of learning the transformations on the plane according the discoverable acts (focused on exploiting e-documents given by e-textbook).

On the reality:

- Investigating teacher and students at some upper secondary schools to show that using e-textbook to help teaching and learning is necessary.

- Designing an e-textbook on the transformations on the plane according to the discoverable acts at the Internet address: http://www.e-edvietnam.edu.vn.

- The dissertation initially tests the projects of exploiting some applications of e-textbook to help students to learn the transformations on the plane according the organized orientation for experiment objects.

The results of dissertation allow us to give the following ideas:

- In real conditions of Vietnam today, the using of e-textbook to help students to learn the transformations on the plane according to the organized orientation of discoverable acts is feasible, it allows us to exploit the latest achievements of ICT and media in teaching geometry in particular and mathematics in general.

- E-documents that are designed according the orientations given by the dissertation showed the theory on e-textbook and discovery learning as well as exploited the strong points of e-textbook in teaching and learning the transformations on the plane. E-documents are suitable with the target, ensure the standard of knowledge and skills of Advanced geometry of grade 11th (given on the Internet at the address http://www.e-edvietnam.edu.vn), when students access the address, students absolutely use these e-documents to learn and documents can continue to improve and develop in order to help students learning the transformations on the plane according to the organized orientation of discoverable acts. Up to now there have been more 79766 individuals to access to this e-textbook.

- The projects of exploiting some applications of e-textbook to help students to learn the transformations on the plane according to the organized orientation of discoverable acts given by the dissertation adapt to the learning requests of students basically and contribute to improve the quality of learning the transformations on the plane for students of grade 11th of upper secondary schools

On the other hand, the exploiting of some applications of e-textbook to help students to learn the transformations on the plane according to the organized orientation of discoverable acts also contributes to improve the applying of ICT and media in learning and life for students. This is one of the most important skills we can have.

From the above results, the dissertations supposes that scientific hypothesis is suitable, aims and tasks of research are completely.

SOME RESEARCH WORKS OF POSTGRADUATES WHICH WERE PUBLISHED REFER TO THE THESIS

Vietnamese

1. Ngoc-Giang Nguyen (2015), "Applying e-textbook in teaching the transformations on the plane according to the organized orientation of discoverable acts", *The Journal of Educational Science* (Specil N^o – April), p. 46 – 48.

2. Anh-Tai Phan, Ngoc-Giang Nguyen (2015), "The discoverable acts in teaching primitive function and integral with the help of the software Maple", *The Journal of Educational Science* (N° 119 - August 8), p. 46 – 48.

3. Anh-Tai Phan, Ngoc-Giang Nguyen (2015), "Applying the software Maple in teaching the discovery of surveying functions", *The Journal of Educational Science* (N° 123 – December), p. 30 – 33.

4. Trung Tran, Ngoc Giang Nguyen (2015), "Using e-textbook to help teaching the transformations on the plane according to the divided orientation", *The summary record of scientific conference on the development of professional competence for mathematics teachers of secondary school*, Pedagogy University Publishing House, p. 125 – 131.

5. Anh-Tai Phan, Ngoc-Giang Nguyen (2016), "Teaching the discovery of surveying and plotting the graph of rational fractional functions with the help of the software Maple", *The Journal of Sai Gon university*, N° 12 (37), February 2, p.101-107.

6. Thai-Lai Dao, Trung Tran, Ngoc-Giang Nguyen (2016), "E-textbook designed according to the divided way and applying e-textbook in teaching plane geometry at upper secondary school" *The Journal of Educational Science* (N° 132 – September).

English

7. Trung Tran, Ngoc-Giang Nguyen, Minh-Duc Bui, Anh-Hung Phan (2014), Discovery learning with the help of the GeoGebra dynamic geometry software, *International Journal of Learning, Teaching and Educational Research,* Vol. 7, No. 1, pp. 44 – 57.

8. Trung Tran, Ngoc-Giang Nguyen (2015), Designing and using e-book to help learning mathematics according to the divided strategy in Vietnam, *International Conference on Mathematical Education Vietnam 2015.*

9. Ngoc-Giang Nguyen, Anh-Tai Phan (2015), Building the process of transformation teaching and learning according to the constructivism with the help of dynamic geometry software in Vietnam, *International Journal of Learning, Teaching and Educational Research,* Vol. 10, No. 1, pp. 120-141.

10. Ngoc-Giang Nguyen (2015), Designing and using interactive e-books in Vietnam, *International Journal of Learning, Teaching and Educational Research,* Vol. 11, No. 1, pp. 75 – 98.