The Designing Of The Division Course In E-Learning System That Support The Math Self-Learning To High School Students In Vietnam

Trung Tran, Lai Thai Dao, Hong Van Nguyen, Minh Duc La

Abstract: The application of information technology and communication in teaching in Vietnam now has seen significant development, the educational institutions actively implementing e-learning through the Internet to improve quality training to meet the needs of learners: Learning anytime, learning anywhere, lifelong learning, open and flexible way of learning. This article proposed process design e-learning system courses base on the division to help developing math self-learning capacity of high school students.

Index Terms: e-learning, division, self-learning, Vietnam

1 INTRODUCTION

E-learning (electronic learning) is a type of training to implement learning objectives, including direct interactions between learners and teachers as the community learning through public information and communication technology. Along with information technology development, e-learning is now studied and applied in Vietnam. Vietnamese Ministry of Education and Training has determined the topic for the school year 2008-2009 that is “promoting IT application to education and training”. For the meanings of this topic, e-learning is considered as a breakthrough for the improvement of education quality in schools, which helps Vietnam implement the slogan of UNESCO for education in 21st century, “study everywhere at any time, study all life, education for every people at all level” [2]. To apply e-learning effectively and promote its strengths, pedagogical models supporting e-learning play a crucial role. Then, we suggest following pedagogical models supporting e-learning play a crucial role. Then, we suggest following pedagogical models supporting e-learning.

2 PEDAGOGICAL MODELS SUPPORTING E-LEARNING

2.1 Online learning

Online learning is the model that uses the Internet links to fulfill studying, searching self-study materials, interacting between students and teacher and among students [1]:

- The strong points of online learning compared to traditional teaching method: Due to its high multimedia-based interactivity, online learning not only enables students to exchange information easily but also provides students at different levels with suitable learning contents so that they can choose the corresponding knowledge and learning methods for their abilities and schedule. This model could make the use of the teacher’s knowledge in the lectures because one teacher can supervise many students at different places simultaneously, which helps students become more active in the richer learning resources. The exchange of experiences and knowledge between students is more initiative. Online learning is changing students’ learning methods as well as their role. Students take a central active role in the training process, they can study everywhere at any time as long as having supporting tools. Students can select their own studying schedules and learning contents that are suitable to their abilities, which allows online learning to enhance significantly the trained objects. Although online learning can not completely replace the traditional training methods, it provides a positive solution for current education issues that is the overload of classes compared to the need of students. To the students as well as the ones who have never been interested in traditional teaching methods, online learning have a significant attraction because it allows working people to pursue their education course. Distant training programmes in the world now have achieved various interfaces and multimedia effects such as: audio, video, three-dimensional images, animation techniques...with high interactivity between the programmes and the users, and network-based communication. This attracts students in studying and improves the learning outcomes. Online learning allows students to control their own learning schedule including time, learning contents as well as order of the lessons, especially it provides an immediate online research on related-lesson contents, quick revision, free interaction between students and teacher during the teaching process that can not be implemented in traditional methods because of high cost. Onlin-learning helps students access the developed knowledge societies in the world as well as provides a quick transition of knowledge.

- The weak points of this model:

First, the lack of direct contacts makes the interaction between teacher and students become more difficult, therefore the control of the teacher is not close. Furthermore, the...
overabundance of learning resources prevents students from a standard one. Thus, due to the objectives and the requirements of social communication activities, the teacher’s courseware should cover not only sound and images to express attitude, emotion, behavior but also a design for students to participate in communication, assess on behavior and attitude in each lesson content if possible. With the IT support, we can solve these issues via electronic interaction such as email, forum or chat. Second, if students lack of self-study awareness, the learning outcomes will be limited. Most of students are not used to habit of self-study and team work and lack of independence in learning. Therefore, the potential of application IT into teaching is limited, though the Vietnamese Ministry of Education and Training has provided many supporting tools to help teachers make their lecture. Compared to traditional teaching methods, teachers have to spend more time and effort on managing an online learning class. Thus, the goals of lesson and subject should be detailed and clear to understand. During the teaching process, teacher should focus on the central contents, which helps students easily adjust their activities according to their learning goals. Besides expressing the science knowledge in logic and needed skills of a student in a lecture system, the teacher should merge studying method and skill formation and technique practice (if possible). When students access the lecture contents and skills, the teacher lead the students follow to his/her intention to achieve the lesson goals. This manifests the leading arts, specific capacities on pedagogical theory as well as the perseverance of teacher. For an effective model, it needs the consensus on teaching and learning goals. Students should know how to use courseware and have several skills in using tools, means and equipments for exploitation of that courseware. Requirements to the teachers: this method requires teacher to have capacity on designing and using modern teaching means/tools and designing test exam. The better teacher expert in IT sector, the better opportunity they could achieve for lesson content presentation in the courseware. Designing a courseware to meet the teaching contents and goals is the first requirement. To fulfill the teacher’s intention on teaching method, communication and construction of students’ attitude in learning, the processing and designing the pedagogy elements should focus on the unity of learning structuers, contents, forms and logical links in the whole programme as well as in individual columns. Furthermore, the courseware should include both awareness activities such as thinking, seeking, testing, examining, and summarizing knowledge; and skilled activities such as memorizing the operation, establishing skills, industrial awareness via imitation and visual images. It should use here the multi-dimension space method including “dimension of contents/skills”, “dimension of awareness/skilled level” and “dimension of links”. Each of these dimensions includes the effects that derive from the teachers’ idea on designing teaching and communicating methods. Based on learning content, education level, technological capacity, and self-ability the teacher could make their own specific designing ideas and arts. According to the view on designing teaching tools, courseware implies the basic characteristics of an imitating means of teaching that helps students gain knowledge through its testing, seeking and responding to emerging involved issues. However, courseware in online learning method involve communicating and linking interfaces for students to record steps of operation and build comparing skills towards the products and learning outcomes. It is a high demand of a courseware used in this way that the teacher has to satisfy. Naturally, it must be the product packages of experts in technical and didactical proficience as well as in IT. To the students, this model not only provides them an opportunity in their whole learning life but also creates a studying and developing society relevant to learning approach for credits. Nevertheless, this involves the high requirements for students such as conditions on facilities, technical equipments, presentation and experiment tools...which is considered as an initial and indispensable condition for internet-based learning method to implement its presentation. Moreover, students need the capacity on communicating and using courseware during their learning process (including interactions, behaviors as well as technical skills and principles for the assurance of system and courseware); in addition the activeness and perseverance of students in studying, according to using instruction of courseware, must be included. Students should know how to examine objectively and study systematically. They also supplement inadequate knowledge and skills in order to respond to inherited contents following to the teaching and examining plans of teachers. To fulfill effectively these demands, students may learn in group and take turns in control of the group.

2.2 Tele-learning

Tele-learning is now used for learning scenarios, in which lectures are transferred to widespread facilities of a school with the help of video-conference [3]. By tele-learning a traditional lecture can be made accessible synchronically in different places or schools by transmitting them via video conference system and thus it reaches more students. Communication and information transfer is network-based or online and therefore not location dependent, however because of synchronicity there is a time problem. This means that the participants do not need to be in the same place but they do need to pay attention at the same time. The following video conference-based scenarios can be distinguished:

- **Tele-lecture**: picture and voice are transmitted from one class to another. In addition audio back channel can be created to support the interaction and which allows the participants to question and state their ideas in different places. The main aim is to capture the local teaching and learning atmosphere and to transmit it to other places. Therefore the presence-lecture becomes accessible not only for more participants but also for participants in different places.

- **Tele-seminar**: in a video conference small seminar groups from different places can connect with each other. Simultaneously to the presentation of learning contents (via audio/video- and data transfers) other interaction channels can be used, such as common whiteboard or chat functions.

- **Tele-exercises**: these forms are based on the scenarios of tele-lectures but they include more interaction between teachers and learners. Compared to tele-seminar, tele-exercises can also use supporting tools and application-sharing.

- **Tele-tutoring**: tele-tutoring, also called asynchronous tele-
teaching, is used as synonym for e-coaching or e-mentoring. Tele-tutoring means the supervision of the learners by the teachers during the learning process. In the context of e-learning the supervision of a learner or a small group of learners is media-based and spatially separated. At tele-tutoring the supervision of students is usually organized in virtual self-learning environments via synchronous (such as chat, instant message, video-conferencing) or asynchronous (such as discussion forums or email). Therefore, tele-tutoring can be used for supplementing or expanding classical further lectures as well as for supporting and supervising virtual self-learning scenarios. Generally, two supervision forms are distinguished as follow: 1. Active supervision: the tutor functions as an animator and try to win students’ participation in the learning and a diagnosis process by active invitation (motivating, encouragement or special rules) and a minimum amount of communication. 2. Passive Supervision: the tutor as an adviser will react to questions referring to teaching contents or students’ statements in discussions. Here, the tutor stays in the background and thus allows more independence and flexibility in learning and communication process of the students. Because of the low amount of communication one tutor can supervise many students at the same time/simultaneously. In practice there are often mixed types in which the tutor actively initiates the learning process or discussion and later is just attending the processes rather passively as a moderator but not as an opinion leader. Tele-tutoring does not only aim to pure support of teaching but also help the students to construct knowledge for themselves. One of the most important issues of tele-tutoring is that independently from the form of supervision- the supervisor can react to the students’ questions and statements quickly. If this issue is not considered there is a big danger of a decreasing willingness to learn and to communicate. This calls the success of the learning scenarios into question.

2.3 Mobile learning
Mobile learning refers to teaching and learning scenarios which didactically include mobile terminal equipment (PDAs or mobile phone) for executing and supporting lectures [4]. They can be used to collect data or to make exercises with cooperative learning in projects. Through mobile learning scenarios constructivist conceptual approaches can be implemented targeted on concrete application situations. The spacial and temporal flexibility can be guaranteed by different possibilities of access.

2.4 Edutainment
Edutainment is a relatively new model in the scope of multimedia teaching and learning offers. The term is a blending of the words “education” and “entertainment”. Moreover, the concept of the word “entertainment” includes different aspects of information teaching (infotainment) as well as complex entertainment applications such as playful learning environments or mobile tourist information systems. In contrast to infotainment, Edutainment focuses on learning and acquisition of knowledge. The main idea of Edutainment is to combine current developments in the fields of the games and entertainment industry on the one hand and the contemporary trends of narrative learning environments for the interface of computer and human being on the other hand. The aspect of playing functions as a factor of motivation to support the learning process. The virtual characters have high independence of behavior and flexibility as well as a high-class real graphic presentation. In future, users or learners can communicate and make experiences with those virtual humans who have emotions and can communicate non-verbally. The interaction has to follow narrative and didactical structures. There, the narrative environments and control is created by a “Narration Engine” which consists of a story engine and a scene engine. These narrative learning environments which are based on current developments of the games and entertainment industry are to be important didactical means for motivation in the learning process. In the field of traditional education, approaches for the playful teaching of knowledge have not yet convinced many people. And thus it seems to be a great potential for the new opportunities of integration of game and education. This has to be proved in scientific research.

2.5 Integration of E-learning into traditional lectures
There are different methods for supporting presence-lectures in traditional class by using information technology. Preparation and revision of learning-teaching contents can be given and used via website systems [6]. Application of multimedia and websites can also be integrated into lesson. Web tools, out of the lecture, supporting interaction between students and teacher as well as among students via chat rooms and forums are really useful. The interaction among students can be increased by using learning note. Besides common traditional teaching tools, the class is equipped with more facilities: computers, Projector and Overhead. . . . During the lecture, students view processing results of computer on large screen. Teacher directly exploits software features to help students recognize the problems. Students often view and judge following to the teacher’s orientation, they do not have many opportunities to operate on computer. Mostly, students work independently and only pay attention to information processing on the screen. Better students do not have chance to promote their own abilities because all the students in class have a same task. There is a competition among students in class, which makes comparison and classification of students be easier. Teacher often focuses on teaching practical skills, reminding and systematizing learned knowledge.

This model can be organized in these following forms:

- Teaching only one part of the content by e-learning: it takes only 1 to 3 minutes to give out the problem of situation, to suggest and verify diagnostic judgments in the process of finding solutions or illustrating the results. This form often applies to the class with large amount of students. Several students have opportunities to operate on the computer. This form saves time and suits the content of a new lesson.

- Teaching an entire content by e-learning: with the aim at using software to solve entirely specific content in one class, it takes 5 to 10 minutes to use teaching equipments. Through software operation, students can discover and solve entirely a problem. This form can be applied to both extensive classes and groups. Exploiting software is integrated into other activities.

- Teaching entire class by e-learning: this form is used for systematizing knowledge in the chapter revision class and in
the end-of-year revision class. The lecture is designed in a united system with integration of teacher’s activities and students’ in order to reach the goal of lecture. Specially, the lecture is designed to make use of softwares’ and computers’ supports. With this form, there is a difference in the amount of time for using blackboard in comparison with other classes, because knowledge content is available in electronic lecture which is compiled as slides including knowledge units, exercises from low level to high level. From pedagogical strategy, knowledge units are structuralized in teaching scenarios. Presented contents consist of events emerged in interacting process. These effects are implemented according to specific diagrams. Analyzing and estimating the response of students are based on the given requirements. The number of slides and their contents are determined so as to express the best lecture content and pedagogical intention. The amount of information in slides is not limited. With the help of tool softwares, the content is expressed not only through texts but also sounds, images, animations, even videos. E-lecture allows a vivid and visual presentation of contents, which can not be done without computer. On one hand, Hyperlink function allows the slides of a lecture to be connected into a system, thus we can access any content of the lecture in one position. On the other hand, we can link a range of lecture into a full system to teach a problem or a chapter. Because of available amount of integrated knowledge in a full linked system, e-lecture allows teacher to change slides following to the learning content by clicking on the name of folders. With the help of e-lecture, teaching procedure happens flexibly; revising process can be done in details or return to presented contents. The amount of knowledge revised in one class is huge, therefore instead of writing or drawing on the blackboard teacher can save time by using e-lecture. With the support of computer and e-lecture, a chapter revision class now lacks of the situation in which teacher has to list learned contents, thus students work positively under the instruction of teacher. Working with “knowledge-tree” contributes to development of students’ dialectic and logical thinking. However, e-lecture is designed in an intended scenario in which the emergence of situation is limited. The solutions are fixed while the fact is various. Therefore, teacher should combine e-lecture with other teaching forms in order to help students bring into play their positiveness and initiative so that the quality of education is improved. In addition, the development of hardware and software technology allows more effective and efficient production of multimedia contents; and automatic record of teaching and learning process. During a lecture, the presented teaching contents are recorded and synchronized to conserve them to produce multimedia teaching documents automatically. To include personal touch and to allow interaction with the presenter, announcement and annotations, overhead projector slides or hand-written comment are also recorded. By a synchronic replay of these annotations, students can understand complex contents. The presentation slides, the audio stream, often also the video stream, the annotations and other elements (such as experiments) and applications are recorded and can be played synchronically or independently. The teaching documents can thus be offered to students for independent use on demand when they want it. Moreover, by system support multimedia teaching contents is able to broadcast simultaneously via web while they are recorded. Thus students in other places can watch the lecture in real time as well. Because this process happens simultaneously with the presence-lecture, there is no need for extra developments and productions for the multimedia teaching contents. On the basis of this method one can guarantee a quick and cheap production of e-lectures.

2.6 Edutainment

A learning situation is called co-operative learning if it includes at least two learners who learn together, conscious and with a common goal. The cooperative efforts may become more productive because of these following reasons: clearly perceived positive interdependence, considerable promotive interaction, high individual accountability and personal responsibility to achieve the group’s goals, frequent use of the relevant interpersonal and small-group skills, frequent and regular group processing of current functioning to improve the group’s future effectiveness [4]. This does not only concern the social interaction process between learners and tutor but also the interaction among learners. This pedagogical model has three forms: “presence based co-operative learning” (only face-to-face communication), “hybrid cooperative learning” (the group communicates and acts face-to-face as well as virtually) and pure computer supported co-operative learning (interaction is only done virtually). For Computer supported cooperative learning should note that each of one four aspects of learning may be problematic in its own right: the situation which can be characterized as more or less collaborative, the interactions between pairs or in groups which can be more or less collaborative, more collaborative mechanisms, sufficient measurements of effects. Computer supported co-operative learning scenarios could be classified by different dimensions including: 1. space, time and duration: Is it presence-based face-to-face cooperation scenario or cooperative learning in distributed systems which is to be organized and computer supported or is there a short-term or long-term grouping? 2. Symmetry: Do the learners have a comparable level of knowledge or is information mostly transferred from the teacher to the learners? 3. Directivity and cognition goal: Does the group act independently is there control over the learning process by somebody? Should every learner individually have the knowledge or should it be the group as a whole? 4. Social structure: what is the form, structure and size of the group? This is determining the quality of interaction. Co-operative learning scenarios do not only aim on the active acquisition of learning and professional skills but on teaching decision-making and responsibility, which is extremely important to the modern life. This competence of decision-making and responsibility consists of three areas: Social competence (verbal skills and soft skills: conflict competence, communication competence, co-operation competence, distance to the own social role, empathy, problem solving strategies); Personal competence (responsible and independent acting, self-motivation, self-reflection); Methodical competence (ability to use means professionally and reflected and to structure work processes and work coherences). In addition to the acquisition of different competences, co-operative learning scenarios lead to an increase in motivation among the group members. Through dynamic group processes the individual members are supported as well as simulated, which may be the only motivation for the learning behavior of the individuals. Moreover, the effect of their own actions contributes to the success of the group and that can produce positive motivations. Group form: Based on the learning content, the group can be divided randomly or due to
knowledge level of the students. For example, to learn a new content the group should consists of random students in order that the good can help the bad. In contrast, in the practicing sections students should be divided due to their knowledge level so that they can get suitable tasks and promote their competences in maximum. Teacher entrusts the tasks to students through open-oriented suggestions or study notes. A group of students share one computer in responsibility to fulfill collaboratively the group’s tasks as well as individuals’. The result is real when the whole group gains their common learning goals, not that each of the members recognizes what individual members have done but the whole group have achieved. Therefore, three main elements of this form are the success of entire group, the responsibility of individual in the group, especially the equal opportunity of success. The advantage of collaborative learning in group is providing students with opportunities to express and exchange their own thoughts. Instead of lone presentation of the teacher, this learning method allows every student in the group to have direct interaction with others, thus the whole group is willing to welcome the judgments of each member. Every individual, besides the opportunity for accessing directly to software, may receive the support from not only the teacher but also the other students in the group. This help the effectiveness in learning improve, in which students can help each other and get help, too. Therefore, the opportunity for success of individual is increased. The worse students will have opportunity to express and learn from others in the group. Computer supported co-operative learning only has the great effect when it is guaranteed these following important elements: establishing a positive interdependence; forming and developing co-operative skills for the students in group; determining the individuals’ responsibility in group; creating an interactive environment between the students in group; forming communication skills in learning for students.

2.7 Computer supported individual learning in presence-lecture
In this model, each of students can use a computer. The lecture is presented at the computer room of a school. The task of the whole class is subdivided into small tasks which are assigned to individuals (thus every student recognises that the success of whole class means the success of individuals and vice versa, despite of independent acting) [5]. When student work with computer independently, they can promote in maximum their abilities. They can solve different mathematical problems at the same time, which is relevant to various awareness levels in the class. Students are encouraged to undertake suitable tasks based on their abilities. The guarantee for concentrative lesson as well as the learning achievement of students after each lecture requires the teacher to have high level of analysis and synthesis. Teacher plays a tele-controlling role by giving a common task for the whole class. Then, students discuss to subdivide this problem into smaller ones (this process happens independently or under the teacher’s instruction). Based on one’s own ability, a student takes on executing a module. During the process, students may have exchange of results. One can use the result of others, even can asks the classmates to adjust the results according to inherited trend for other students.

2.8 Blended learning
E-learning increases the students’ interactivity, which provides favorable conditions for micro education with high division level [2], [6]. However, pure E-learning is not a perfect solution, which needs to make the use of advantages of different training methods. Consequently, the combination of e-learning and traditional methods creates a good model (blended learning) with the following forms:

- **Online and offline learning**: organizing online seminars and forums, face-to-face discussions under the control of the teacher; making out specific learning plans, entrusting exercises to students so that they can discuss directly or via learning forums.
- Various lesson forms, learning materials and exam questions can use written testing method or computer-based testing method. In traditional classes, teacher should introduce information technology into teaching through e-scenarios, online news and essays as well as games (if have). Students should be used to not only searching materials on Web but also sharing these materials by giving topic and related websites, references.
- Formal and informal learning method enhance the learning in group, the discussing in group, the working in group and the implementing teaching plan in group, even the examining students in their group.
- Synchronous and asynchronous learning create online forums for teacher and students who can interact directly (via chat, chat room or voice chat)

**Pedagogical method consists of these following stages:**

- **Preparation**: the teacher must “structurelize” learning contents, which means that students should gain the main contents of the lesson to meet its minimum requirement (so-called the 1st level). The less important contents should be known (so-called 2nd level). There are the contents that students might know but not affect to learning goals (so-called 3rd level).
- **Teacher starts teaching activity** by showing entire structure and logic of lesson content in specific levels so that students can search for knowledge themselves. Then, they form the activeness and creativeness in learning, which varies training process into self-training process. In the class, teacher introduces the aims, requirements and approaches to lesson content.
- **Teacher makes use of time to provide knowledge** at the 1st and 2nd level, and then asks students to seek for content at 2nd and 3rd level.
- **Teacher instructs students** how to search for lesson content that is divided into different levels relevant to different learning objects (excellent, good, medium, bad) based on online textbooks or conferences; asks students to present their results and gained knowledge in discussions or seminars in the class. In order to teaching effectively, teacher should be conscious that teaching must help students not only aware and concretize learning goals reasonably, but also understand learning mission which implements valid objectives and creates learning capacity. Teacher has to guarantee the possibility of learning objectives given by the teacher and can catch the information in reverse direction. Teacher should master interactive teaching method as well as teaching
technology. Teacher should be the person who discovers and fosters the creativeness of students. Blending promotes learning effectiveness and creates favorable conditions for teaching at three levels of lesson structure in the teaching methods mentioned above. Blended learning can be organized with the following levels:
- Teacher designs, packages and transfers learning contents; creates forums; supervises simultaneously online self-study and study in traditional class.
- Teacher requires students to learn a module via the Internet involving to their subject so that students can get used to e-learning.
- To the contents that are able to apply e-learning, teacher executes teaching process via the Internet entirely in order to decrease time and education cost. In summary, for an effective e-learning it should have meticulous study on rationale and practice of teaching to aim on training-on-demand objectives, training for credits and applying IT goals for the improvement of education quality.

3 TEACHING DIVISION OF E-LEARNING ENVIRONMENT
Each unit of knowledge in the division curriculum is a specific knowledge content and some questions, suggestions help students answer the questions to consolidate learning outcomes will consolidate and enhance their knowledge and split students: the students who meet the requirements will learn next unit of knowledge; the rest students must relearn unit of knowledge that is not achieved, but more specific guidance and more detail that help students understand the content and knowledge requirements of this unit is for the weak students [7]. The design teaching division curriculum is done by following these steps:

- **Step 1**: Dividing the course into the chain of lessons. Each lesson solves a certain knowledge unit.

- **Step 2**: Developing strategies teaching for each lesson, the knowledge for dose series (not too small). Duration for each dose of knowledge is from 10 to 20 minutes of study (depends on the level of students). Each dose of knowledge can be a concept or a certain nature

- **Step 3**: Studying the path of polarization in learning activities of students to sort out each dose of knowledge. Write a fertilizer teaching plan respectively. This is the most difficult step but also creates the distinction between e-learning systems, the system that has appropriate strategies for fertilizer teaching will help students achieve high efficiency during the study. To the division which takes place automatically and appropriately with each level student, need to give multiple choice tests, with the selection of a certain answer, students will be instructed to follow branch that is appropriate inferences. Division curriculum must be seen in view of "development approach" [8]. The Program that was given, can always be improved more and more suitable for students; there is contrary information for teachers about students which will make stain thinking (activity trace) of students. Thanks to observe traces of thinking that can identify the thinking changes of students, that helps teachers to adjust their teaching strategies appropriately.

4 DIVISION COURSES DESIGNED FOR E-LEARNING SYSTEMS TO SUPPORT STUDENTS TO STUDY
We had built e-learning system in teaching mathematics in high schools at a Vietnamese interface http://www.toan12.net follows:

**Fig. 1. The interface of e-learning system**

The online course in e-learning system will provide initial information: concepts, theorems, the knowledge with artwork that students need to know to be capable of studying, students study, research to get information and then do the tests with knowledge that reinforce or improve the content on the system given; if students have satisfactory answer for each question, the computer will continue to offer more information. The process of continuation is until the end of the course. The features of e-learning system is that if students have not correct answer, the system will provide some relevant knowledge to suggest and additional questions with many answers in order to fertilize students.

**Fig. 2. Online course in branching strategy**

E-learning system with modules that gives teachers the guidelines to write online lectures. The content of lectures appeared as the form of the trees that consists of data: lectures, text and chapter, section, question. The Questions were designed with multiple choice, true-false questions and additional questions were divided into several branches with knowledge that often appears in common mistakes of the students. Division requires to design online courses for high school mathematics, from a unit of knowledge, teachers must
grade the level of knowledge that appropriates to each student and knowledge coaching that supports for unsatisfactory students and bad students. Since then, organizations and guides students to solve problems in order to achieve the learning task. The radical division is not a difficult issue in technique in e-learning system. The most difficult aspect is pedagogies, because it highly depends on ability, professional experience of the teachers. E-learning systems provide flexible data and feedback from the computer to have environment for teachers to organize to work in group for students in order to provide more information to guide the students to find the solution for the test.

For example: Build division course "straight line equation in space":

* **Step 1**: Determine the mistakes that may common happen to students (knowledge, skills and concepts).

* **Step 2**: Turning the course "straight line equation in space" into online course that follows the division strategic. This course is divided into 4 units of knowledge. Each unit of knowledge is designed separately and gives information of the units of knowledge. For each unit of knowledge, building 4 questions with multiple choice, each multiple choice question will have only one correct option, if students has choice incorrect option $T_i$ then the system offers support guidance $H_{di}$ to help students overcome to continue to the next unit of knowledge.

**Fig. 3. Answering schematic for a question of course**

In Vietnam, the math program of the grade 12 includes 12 questions of 4 knowledge units, three advanced questions of them questions are given to help classifying good and excellent students. Thereby, we can make a diagram of a online course following branching strategy below:

**Fig. 4. Branching diagram of the knowledge units in the course**

* **Step 3**: Take online course on e-learning system. Teachers will be helped to put the content of the course easily by using tools function that has been designed on the tools of e-learning.

* **Step 4**: Students are organized to learn "linear equation in space" on e-learning system by themselves. Students operate sequentially under the rule of the software that has been programmed: They will study next information if they give the correct answer. Moreover, they have to give the right option for additional question to be learnt next question, they will be guided and answer the additional question if they give the wrong answers until they have completed information (questions). The results of the option of the question are stored in the system. Thanks to "trace" teacher can keep the changes in the thinking process of students. Thanks to the answering results of students and the errors of individual student that has been saved in e-learning system, teachers can find out the shortage of knowledge to have good solutions to foster bad students and improve knowledge for better students.

* **Step 5**: Teaching adjustment strategies for the course "line equation in space".

**5 CONCLUSION**

Thanks to online courses in branching, teachers will be convenient in helping students understand the concepts, practice skills, develop creative thinking and clarify the division of teaching, personalize teaching in e-learning space; teachers can also detect and correct the mistakes, the knowledge that needed supplementing, advanced knowledge for students through the evolution process of the students that has saved in the system, teachers can adjust teaching strategies appropriately.

**6 REFERENCES**


