Development of an interactive e-learning model for an instructional design course

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Development of an interactive e-learning model for an instructional design course

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ABSTRACT: This research aims to develop an interactive e-learning model by using the Edmodo programme in an instructional design course. This research was planned to be conducted in three stages spread over three years. During the first stage in the first year, an analysis of the most suitable interactive learning model used in designing the learning instruction was undertaken through a survey of preliminary studies, including the identification of learning needs and the determination of the standard competence of the course. Stage 1 has been completed. The article examines an analysis of the learning process, identification of students' initial characteristics and behaviours, the arrangement of basic compentence and the indicators, the writing of standard tests, the arrangement of learning strategies, development of learning materials as well as the initial design of model based e-learning.

INTRODUCTION

Today's learning faces two challenges. The first challenge comes from a change of perception about learning itself and the second comes from the presence of information and telecommunications technologies that continue to show tremendous growth. Constructivism has essentially responded to the first challenge by redefining learning as a constructive process in which information is transformed into knowledge through the process of interpretation, correspondence, representation and elaboration. There are two challenges currently for teaching and learning practices. One challenge comes from the change of perception about learning and the other comes from the tremendous growth of information and telecommunications technology. There have been many studies with different views that have tried to answer the first challenge. One of them is based on the constructivism view. This view emphasises that each individual constructs knowledge by giving meaning to his/her experiences. Hence, according to this view, learning should provide the opportunity for students to construct their own knowledge actively. Meanwhile, the rapid advancement of information and telecommunications technology offering new easiness in learning enables the shift of learning orientation from outside-guided to self-managed, and from knowledge as a possession to knowledge as a construction. This technology playsan important role in renewing the concept of justification that initially focuses on learning as merely a presentation of various forms of knowledge into learning as guidance to be able to carry out the exploration of socio-cultural rich knowledge.

The focus of the transition of this concept is actually to improve the quality of human resources. There are some aspects that affect this improvement effort in higher education. One of them is the designing ability of the lecturer. The quality of learning design most likely influences the learning quality, which later may affect the improvement of students' quality. Rooidjakkers proposed that teaching is a knowledge-transmitting attempt [1]. This view emphasises that learning activity should help the learners to understand the transmitted knowledge easily [2]. Learning media plays an important role in delivering the messages in order to achieve this condition. One of the media that involves information and telecommunications technology is e-learning. In order to ensure the success of designed e-learning, the designer needs to consider the underlying pedagogy about how the learning takes place on-line carefully; with this consideration e-learning will improve the institutional and instructional productivity [3][4]. Thus, the lecturer is expected to be able to create a high-quality learning process, so as to enhance student achievement. Roles that can be played by lecturers in learning include being a learning designer, manager and evaluator [5].

The approach of classical learning by using lecturing methods is still highly favored by lecturers, because it has several advantages compared with other methods. The advantages of lecturing methods include it being sparing in the use of time and media, in addition to it being practical and economical in conveying the content of learning. With the lecturing method, lecturers can easily control the teaching pace to ease the determination of when the completion of the delivery of the entire contents of the lesson is. The development of science and technology has brought changes to learning

materials. Education is blended with information technology as media develop the birth of the idea of e-learning or electronic learning. There are different types of e-learning such as Edmodo, Blackboard, Sakai, Dokeas, etc. E-learning is a form of learning that uses electronic circuits or Internet networks to convey the content of learning, interaction or guidance. It is also used for distance education and is done via the Internet.

E-learning is also an indirect learning activity (asynchronous) through a computer electronic device to allow students to obtain learning materials to suit their needs. Furthermore, technology is not everything, but it is a complementary factor in establishing e-learning systems, both asynchronous and synchronous [6]. This is also in line with Anaraki who opines *…It can be considered scheduled delivery of learning and may take the form of multicasts, video conferencing, and virtual classrooms, etc* [7]. In addition, the material can be enriched with various learning resources including multimedia and can be quickly updated by the instructors or lecturers.

The Educational Technology Study Programme (TP) Graduate Programme (PPs) Universitas Negeri Medan (Unimed) is one of the courses in PPs Unimed. One area of educational technology is the use of technology in learning. Students' difficulties and low achievement in learning, and the opportunity to integrate the development of information and communication technology in learning show the need for innovative learning instructional design. Based on its characteristics, the Educational Technology Study Programme is an appropriate course to develop such innovative learning instructional design, which is student-oriented and facilitates challenging, active, fun learning needs and dealing with daily life, as well as preparing students for the future that is characterised by the development of information technology and global competition.

An e-learning or virtual learning environment may be seen as a collaborative group or self-interactive learning system with closed or open access. It may be Web-based or hosted by a learning management system that provides learners with an opportunity to interact with learning resources or activities, and facilities such as communication tools, evaluation tools, learners' management and support that can support the e-courses [8]. One way to do so is by integrating instructional design in the learning process with information communication technology, which is better known as interactive e-learning. One e-learning application is to use software that helps planning, designing, analysing, implementing, managing learning and giving learners access to material whenever and wherever learners are located, which is known as a learning management system (LMS). The main solution provided by LMS is to replace conventional teaching programmes with more interactive learning and to provide systematic assessment, as well as to improve the learning competencies of an individual or group.

METHODS

Development Model

The research method is the development method, and the development model used is a modified Borg and Gall development model [9]. The stages of the development are as follows: 1) planning and early information collection, in this case, literature studies related to the problems encountered are conducted; 2) planning, at this stage, the activities are related to the formulation of skills and expertise regarding the problems; 3) development of initial product, the initial form of e-learning is being developed through development of the learning model; 4) preliminary field testing, this stage is a testing phase on a limited scale based on observations or questionnaires; 5) main product revision, at this stage, reviews and improvements are made to the initial learning products produced based on preliminary test results; 6) operational product revision, at this stage, corrections/improvements will be done towards the results of a wider trial; 7) final product revision, at this stage, improvements to the developed learning model will be done; and 8) dissemination, at this stage, implementation activities will be done [9]. The syntax of this model is represented by Figure 1.

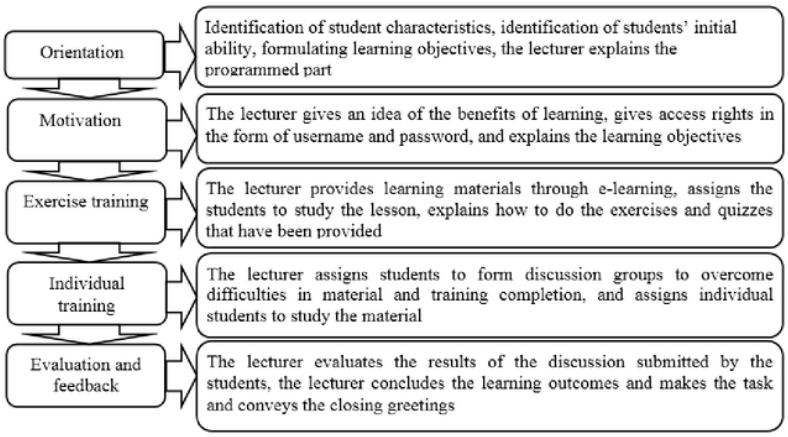

Figure 1: Syntax of e-learning instructional development.

Research System

This research involves students actively in the whole process starting from preliminary studies up to the final product design. Systematic research that will be done is as follows:

This research has been conducted in three stages, with each stage being the implementation of the year. The research is still in the first stage. The first phase of this activity was to analyse the e-learning learning media that are most appropriate for use in an instructional design course, through a survey in the preliminary study, including identification of learning needs, identification of student characteristics and identification of a student's initial ability. Also, the course's standard competence was determined, including learning analysis, identification of characteristics and behaviours of the students, the writing of basic competencies and their indicators.

The test of learning outcomes to be made on e-learning is the reference of the standard test.

The next activity was to develop learning strategies and learning materials. Also in this lesson, there was a quiz to be taken by the students; therefore, it was necessary to arrange a quiz based on the completion of each specified set of materials and to give feedback.

The second stage is to be done during the second year. Activities done at this stage are gathering materials, including: creating and collecting images and animations, recording and collecting audio, developing and creating interactive e-learning learning media. The next activities are to study the learning media, competencies and materials, which have been identified in the first stage. Learning media, materials and competencies will be tested on both a small and large scale. The result of this test will be used as input to revise the earlier stage. Thus, at the beginning of the second stage, limited trials, large-scale trials, revisions and results are done and acquired. In the second stage of the study, test methods are used through the procedures of:

a) an expert review;
b) one-to-one testing;
c) small group trials;
d) large group trials for operational learning media.

The third stage is the third year. Activities undertaken at this stage are to develop guidelines for the implementation of interactive e-learning media, evaluation and dissemination through experiments to see the effectiveness and efficiency of the developed interactive learning media.

Data Collection and Analysis

Measurement of the practicality of the interactive e-learning model, which in this research is based on the use of Edmodo; hence, it is developed and compiled from several research instruments. The instruments used in this study include:

1) questionnaires of students' needs on interactive e-learning model based on Edmodo and the learning tools being used;
2) questionnaire of lecturers' needs towards interactive e-learning model based on Edmodo;
3) quiz of each chapter of the instructional design course;
4) the final test in the instructional design course.

RESULTS AND DISCUSSION

The results obtained in this research are a product in the form of an interactive e-learning model based on Edmodo. In the first stage during the first year, an analysis of the most suitable interactive e-learning models in instructional design course was done, through a preliminary study survey.

The development of the learning model for the instructional design course was done by paying attention to the recommendations put forward by Borg and Gall [9]. The presentation of the results of this study follow the stages of development that have been described previously. The results obtained at each stage of research and development is presented as follows.

Literature Review

The stages taken in this literature study were:

1) listing all the variables that needed to be researched;
2) finding each variable problem through analysis;
3) selecting the description of the required materials from the available sources;
4) checking the index containing the variables and topics of the problem studied;

5) more specifically looking for articles, books and biographies that are very helpful to find materials relevant to the problem studied;
6) once the relevant information was found, the researchers later reviewed and arranged the literature in order of importance and relevance to the problem under study;
7) information materials obtained were then read, recorded, arranged and rewritten;
8) in the last stage, writing the process of research through the materials that have been collected together in a research concept, which is the result of the literature review.

The references in conducting the literature review were primary and secondary literature sources. The main literature sources include empirical research reports, instructional design documents and monographs. These sources are accessible and widely available through the Internet network. The main literature sources consist of an index of the latest educational journals, abstracts and indexes related to instructional design that discuss research issues with specific studies, document indexes, dissertations or theses and citation indices. Second is literature sources. In addition to the main sources, there is also a second source that can be used as research reference consisting of: professional books, encyclopedias, special handbooks, which provide information on instructional design and ERIC (Educational Resource Information Centre).

Through the literature review, it was also found that there are matters that must be considered in the development of e-learning, which are:

a) suitablitiy of the learning model, the learning model being used should be suitable, with the facilities and infrastructure;
b) attractiveness of e-learning display, the application views should be able to stimulate students' interest for learning;
c) features of e-learning applications, completeness of existing features on e-learning should be tailored to the needs of lecturers and students;
d) content of cognition, content of the programme should provide the cognitive experience (knowledge) that students need;
e) media integration, media should integrate several other aspects and skills;
f) aesthetics, to attract learners, e-learning must have an artistic look;
g) Function as a whole, the programme developed should provide learning to the students, so that when the student finishes running an application (Edmodo e-learning), the student will feel they have learned something.

Previous Research Findings

In designing a new product or educational programme, the research findings, which are related to the principles of instructional design based on the research results should first be described.

From the preliminary research results, data obtained showed that there are still 47% of lecturers who do not have complete lecture material at the beginning of the lecture, only 27% of lecturers who use the Internet as a medium of learning, whereas as many as 87% of lecturers have used computers or laptops as learning media. This is in line with the data indicating that as many as 87% of lecturers conduct lectures in full face-to-face manner. The above data show that lecturers still have to be encouraged to take advantage of IT support in implementing their learning.

There are several research results that have been used as references in developing this research, all concerning the development of an e-learning model with effectiveness in the use of e-learning for school students and university students, that have been very helpful in this study along with preliminary research that has been done. Based on them, a new e-learning model may be required to outline students' learning strategies in an Internet-based learning environment [10].

Needs Analysis

Nowadays there are more students in higher education who choose e-learning or distance education. Like all learning technology delivery environments, it must be based on epistemological frameworks to be effective for teaching and learning [11-13]. The result of the analysis showed that students who take the instructional design course need an interactive and attractive learning strategy. Based on that condition, students' needs analysis for that course was established by giving a questionnaire to 66 students and three lecturers. The general result of the questionnaire can be seen in Table 1.

Table 1: General result of needs analysis questionnaire.

Category	Lecturers		Students	
	Numbers	Percentage	Numbers	Percentage
Need	2	66.67%	64	96.97%
Do not need	1	33.33%	2	3.03%

The results based on the data analysis of students' needs are presented in Table 2.

Table 2: Data needs analysis by students.

Type of information	Number of students	Percentage of students
Very difficult courses	20	30.3%
Difficult courses	30	45.45%
Easy courses	16	24.24%
Media of course is sufficience	30	45.45%
Media of course is adequate	30	45.45%
Media of course is inadequate	6	9.09%
Agree there is a new media in the course	60	90.9%
Disagree there is a new media in the course	6	9.09%
There should be a learning objective in a new media	66	100%
The materials should be brief and clear	50	75.75%
The materials need to be clearly elaborated	16	24.24%
Instructional design materials are essential and should be followed by some examples and exercise	66	100%
Essay as the form of evaluation	36	54.54%
Multiple choice as the form of evaluation	25	37.87%
True or false as the form of evaluation	5	0.75%
The developed interactive e-learning tool using Edmodo is the solution to improve students' competency	55	83.33%
The developed interactive e-learning tool using Edmodo is not the solution to improve students' competency	11	1.67%

The results based on the data analysis of lecturers' needs are presented in Table 3.

Table 3: Data needs analysis by lecturers.

Type of information	Number of lectures	Percentage of lectures
Students need to have a good mastery of the instructional design course	3	100%
The media to study the course had been adequate	2	66.67%
The existing media is not yet enough	1	33.33%
Need the new media to learn the instructional design	3	100%
The learning objectives need to be delivered in the media	3	100%
The instructional design course should be briefly and clearly explained	3	100%
Instructional design materials are essential and should be followed by some examples and exercise	3	100%
The developed interactive e-learning tool using Edmodo is the solution to improve students' competency	3	100%

Learning Media Analysis

The learning tool used in this research was the interactive e-learning tool using Edmodo. A field study was also conducted on the university students, to analyse the interactive e-learning needs using Edmodo from users' side. Based on the survey, it was concluded that:

a) the e-learning tool developed by Edmodo must be interactive. This means that students must be directly involved in the process of learning to enable them to learn independently, so it is not only the presenters who act actively, but also the students;
b) the interactive e-learning materials should be designed using a familiar language, so that they could be easily understood by students, as well as provide simple illustrations or pictures;
c) the simplicity to operate the interactive e-learning using Edmodo, which is accomplished by several features needed by students, lecturers, parents and all stakeholders is expected to facilitate students to view the materials and be responsive to students' command, take the tests, view the learning results; students' parents should also see their children learning reports;
d) the interactive e-learning using Edmodo should also be interactive and not boring, use simple language and provide good solutions to solve the problems in the materials;
e) the appearance of the interactive e-learning using Edmodo should also interest students;

f) regarding students' experience, the interactive e-learning using Edmodo is expected to make it easier for students to comprehend the materials and enable them to learn independently by constructing their own knowledge.

The Analysis of Learning Tool

The product of interactive e-learning using Edmodo needs several stages, such as: analysis, design, development, implementation and product assessment.

The analysis stage aims to gather relevant information about the need for interactive e-learning using Edmodo. In this phase, cooperation between lecturers and learning developers is needed, which should also be in line with the implemented curriculum.

The design stage includes the determination of several elements that need to be input in the application of interactive e-learning using Edmodo which is suitable with instructional design. This stage results in meeting the design goals, flowcharts, storyboards and user interface design.

The development phase aims to produce the initial product, which is then tested to determine whether the results are as expected or not. The development phase in the interactive e-learning using Edmodo includes providing a storyboard, flowchart, graphics, media and system integration.

The implementation stage is categorised into the product testing, and aims to know the attractiveness to students of the developed multimedia and to obtain data, such as test scores. The implementation of the development of interactive e-learning using Edmodo is adjusted to the applied learning model. Students could use the e-learning interactive learning using Edmodo creatively and interactively through an individual or group approach.

The assessment phase aims to check whether the interactive e-learning using Edmodo is suitable with the instructional programme. The assessment includes checking the appropriateness of the products, students' motivation before and after using the interactive e-learning, students' responses through the interactive e-learning tool developed by Edmodo, as well as the advantages, disadvantages, obstacles and recommendations from the developed multimedia.

The Results of the Development of Interactive E-Learning Tool using Edmodo

Based on the results of literature review and field survey, needs analysis as the general overview to develop interactive design instructional multimedia is obtained. The results of the needs analysis in regard to the interactive e-learning tool using Edmodo, which is going to be developed:

1) would be about the instructional design based on information and communication technology;
2) would be interactively and attractively designed for the users;
3) would adapt the function of the tool;
4) would present the learning materials that will be in line with the schedules and the stages of the materials;
5) will be interactive with the existence of challenges in form of tasks, questions, evaluation and some rules on how to do it;
6) could maintain students' motivation to learn;
7) could be used on any computers and be easily navigated.

The Process of Designing Interactive E-Learning Tools using Edmodo

This design process is the phase to make an interactive learning plan using Edmodo, which would refer to the previous results from the needs analysis. At this stage, a concept about interactive e-learning tool is obtained, that is *instructional design*. Generally, Edmodo interactive learning is an on-line interactive tool, which invites students/users to look for the learning materials for the instructional design course and to construct their own knowledge. The course materials would be inserted at the exercise part, which must be followed both on-line and in the class. The evaluation would be presented in the form of multiple choice questions and an essay. Based on the previous illustration concept, and to ease the process in the development phase, this stage provides a flowchart, storyboard and user interface. Each part is elaborated as:

1) define the product development goals or a programme in a clear statement form in order to be able to be clearly evaluated;
2) in order to fulfil the recommendation, this research has formulated clear development goals, which result in the interactive learning tool using Edmodo consists of syllabus, lesson plans, evaluation learning materials, and on-line learning programme.

CONCLUSIONS

Almost all students responded positively to the interactive learning tool using Edmodo, because it has benefits, attracts students, as well as improves students' motivation to learn. As observed from the general aspects, software engineering,

visual communication and the content of materials, it can be concluded that the result of the interactive e-learning tool using Edmodo needs to be progressed to the validation and product testing process with the decided criteria in the research method plan and development. The use of interactive e-learning tool using Edmodo could benefit both students and lecturers.

As observed from the instructional design course, multimedia aspect, the simple use and interactivity of multimedia, students are expected to have their own computers, so that the instructional activity using Edmodo interactive e-learning tool can run smoothly. The development of an interactive e-learning tool using Edmodo is still continuing. The next phase would be about expert validation and testing with revision until the determination of the effectiveness of the learning products by conducting experiment to establish the quality of the developed products.

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