Designing e-Learning Courses Using Learning Simplification Method

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Abstract: A change in the curriculum and the learning objectives has brought complex challenge for teacher in explaining material and e-Books to learn. Teachers are faced with the challenge to find the right e-Books and learning material for their students. This study aims to propose a method of learning simplification to the instructional media to support learning in subjects that are considered difficult and has many various e-Books. This study is conducted to determine the suitable model of e-Learning design as academic learning material. It tested and evaluated the relationship between the design and material suitability. It used quantitative approach with research and development analysis for orientating website development. Furthermore, the data were analyzed using OLS (Ordinary Least Squares) method with e-Views Version 4.1. This study tested web display, quality of instructional media, expediency, classroom interaction and knowledge adsorption. The results showed a significant relationship among the tested variables and have significant result toward increased knowledge adsorption.

Key words: Curriculum, e-Learning, instructional, interaction, propose, material

INTRODUCTION

A change in the curriculum and learning objectives has driven school to find new learning method to support their student to adsorb new knowledge from schools (Allwright, 2014). The condition provides a challenge for teachers and students due to the learning materials are increasingly numerous and changing patterns of student learning and engagement. Teachers are faced with the challenges to provide media education to improve literacy, learning and contemporary culture. Three kinds are often called knowledge strategies.

This challenge the teachers to provide suitable learning model (Boaler and Sengupta-Irving, 2016) which suitable with the student needs, especially, to enter the digital era literacies, the technology-mediated learning is considered important to implement in the classroom for example by implementing e-Learning.

Various attempts have been made to improve the effectiveness of the efficiency of learning and one of them with the development of e-Learning approach 3. With e-Learning system the learning process can take place anytime, anywhere, without the constraints of time and space (Buckingham, 2013). Students and faculty can make the process of teaching and learning through computers connected in a network of e-Learning. Implementation of e-Learning in the lecture has increased the motivation and student learning outcomes, however,

the students still have problems in terms of understanding the abstract material which need explanation than conventional class method (Hawkins, 2015).

However, e-Learning is often difficult in sustaining the momentum in learning activities and is sometimes considered difficult to produce virtual classrooms that effective and contains suitable learning methods as a new framework (Bunch, 2013). Therefore, we propose a model of e-Learning that can help teaching and Evaluation instrument which contain a combination of the above and also evaluate the result in classroom setting.

In this study, the researchers considered the problem to be the focus of research by proposing a design of e-Learning course for engineering courses on Universitas Teknologi Yogyakarta (UTY). It is expected that the frequency of all activity and practice in the class is started from the student initiative and their activeness through self-initiative course (Clark and Mayer, 2016). Students are instructed to try more often to the allocation of time in finding the ideal way and the answer to the problem and change initiatives with teachers and peers to learn them.

e-Learning media has been proposed to increase the learning outcomes and contribute to the successful of learning, since, it can deliver more suitable learning materials (Cook, 2013; Danielson, 2013). Therefore, this study will observe and evaluate several aspects which

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can contribute to the student learning outcomes after they used the e-Learning model. The aspects which being evaluated are expediency, display, operation, web speed access of access, adsorption aspects and interaction in the virtual class.

Literature review

Learning theory: Learning activities are defined as the addition of knowledge comes with practice and discussion between students and teachers, so that, students become students quickly and accurately (Henrie *et al.*, 2015). In fact, teachers are faced with the challenge of providing relevant knowledge and develop learning activities which burdening students (Allwright, 2014; Boaler and Sengupta-Irving, 2016; Buckingham, 2013). Therefore, understanding students and proposing better design of learning approach as milestones of teacher efforts (Brookfield, 2015; Clark and Mayer, 2016).

Web display: A characteristic of students is important in the design and development of media-assisted learning website (Brookfield, 2015; Cook, 2013; Danielson, 2013). In classroom with e-Learning model, it is represented by the aspect of web display which contains clear instructions for use. In addition, there are students features that the teachers must considered such as their ability and experience of students in understanding the learning goals and the course materials difficulties (Entwistle and Ramsden, 2015). The e-Learning model with high readability and systematic position of learning materials also helpful for both student and teacher. The web display also can be influential in identifying, elaborating and organizing systematic concepts that are relevant and very important to understand the purpose and the adaptability of the students in the class. Web display also can contain quality images and an animation to support the narrative illustration which makes the content is easy-to-remember.

Quality of instructional media: Design of learning is important to match the learning objectives and tasks with the student ability (Brookfield, 2015; Senge, 2014). The design represents the quality of learning media which influenced by expediency (convenient and practicability) (Brookfield, 2015; Senge, 2014). In the analysis of the learning task, it is necessary to identify the tasks skills that the students must do in their learning (Clark and Mayer, 2016; Simonson *et al.*, 2014). The tasks must be arranged in logical display, operation and access. In addition, it is also needs display that contains the specifications of learning objectives (Clark and Mayer,

2016). This stage is made to estimate the achievement of learning outcomes toward goal of learning. In order the students can understanding the course material the instructional media must have features of adsorption aspects and interaction in the virtual class.

Expediency: The students participated in engineering course classes to various task assignments from more than 5 e-Books which burdening and seizing their time. In total, the book or e-Book given by the teacher ranged 1500-3000 pages within one semester of their study.

This needs expediency approach to improve the student knowledge adsorption. If students are not helped to do expediency approach, this can be a burden for students who are not active in the classroom.

It means that the expediency approach will increase the quality of teaching media (Kolb, 2014). For aspects of expediency, it generally showed the usefulness of learning media especially in tight schedule and brings benefits to both teachers and students.

Knowledge adsorption: The frequency of all practiced e-Book contents is representing the knowledge which transferred to students and become student's activities as reflection of the student adsorption in the e-Learning with self-initiatives (Allwright, 2014; Boaler and Sengupta-Irving, 2016; Buckingham, 2013). In addition, the quality of learning media can affect the knowledge adsorption among the student (Brookfield, 2015; Senge, 2014). The quality can be indicated by the insertion of Adobe Flash on the website as an animated feature with action script in a web page. Knowledge adsorption also represents the effectiveness of students achievement to adsorb knowledge from the class through self-initiative.

Rapid web access: Web access is important because it affects the quality of learning media usage. In fact, the speed of web access is also related to the ease in processing information on environment with multi user. In the school environment, rapid web access can affect the quality of instructional media, e.g., if the speed of web access is good then the media is considered to have a high quality. Media with web access that can quickly deliver a message from the sender to the receiver as it can stimulate thoughts, feelings, concerns and interests and the willingness of students to take place in order to achieve the learning objectives effectively (Buckingham, 2013; Yilmaz, 2017). The high levels of speed make it easier for the sites to be accessed by students and monitored by school. When multiple users access the same time, it is possible that the site is slow and need of improvement in access speeds.

Operation of e-Learning media: e-Learning provides a learning environment where all students are valued and able to reach learning goal. e-Learning must be relevant to instructing, teaching and learning. In the operation of learning media, the quality of media is very important since, it enhance student attention and motivation.

The operation of e-Learning media are started from designing and developing e-Learning courses and the application of learning strategies and media to courseware development to get effective multimedia learning to improve the compatibility of operation and learning media (Buckingham, 2013; Bunch, 2013). By using electronic educational technology such as web-based classroom, the operation can be carried out in various places and the users can use it more easily while resolving technical issues and improve the student proficiency. To do so, the operation of e-Learning courseware must begin with an understanding of the website suitability with the learning goals and student situation. The operation must prevent any overload of the visual and auditory components by concrete application scenarios to establish interactive classroom. The main goal of operation is to measure the appearance and performance of instructional media to be used easily by the user.

Virtual classroom interaction: Virtual classroom has class size ranges from small groups consisting of 6 to pupils or students. To study the interaction of hundreds of subjects with the interaction between students and teachers this conducted a separate place to facilitate the effective communication interactions among teachers and students. This virtual class facility exist interaction between users, evaluation of lectures, course materials, so that, students can see the video again every time after classes. In a virtual classroom teachers and students could share materials, messages, so that, learning does not become boring because there is interaction, discussion and group together in virtual and evaluation of learning can be implemented immediately and independently.

Learning simplification method: Procedure for solving complex learning or so-called learning simplification methods has been proposed by George and Robinson (1947) to simplify the complex learning process, particularly in the fields of engineering courses and business. The method is a procedure to simplify algebraic geometric learning process to facilitate the search for the optimal solution of a pathway problem and how to reach the goal. Teachers should help students to define each step of the learning pathway and then specify a conclusion and give an explanation in brackets.

In e-Learning, it is the process of making something simpler or easier to do or understand through website. This means that it is proposing simplification of the classroom system to make learning is easier to do and reduce complexity in conventional class activities. It also needs to simplify management procedures. In class, it is to make student to be more intelligible and help them to clarify of the steps comprising a work in a manner that to improve knowledge adsorption among the students. However, simplification also has drawback, since, it can reduce the accuracy and detail of the information about the learning material. For example, in the mathematics lesson, the simplification of an expression or equation by eliminating radicals can lead to student blurring to understand the complete process of calculation. Therefore, the technique can be done to reduce composition to only the most essential elements that support the visual statement. This technique is particularly important to explain the concept of countable and uncountable or plural into something that can simplified in logical manner.

For student, it is to solving design simplification problems by analogical reasoning and defined context of the learning materials. For teacher, it can be curriculum modification or classroom activity and altering classroom environment in ways that favor needs in the most compact or efficient manner, without changing the goal of learning.

MATERIALS AND METHODS

This type of research used in this research is the development of a quantitative approach-oriented website development. Thomas *et al.* (2015) describes Research and Development (R&D) is a strategy or method that is powerful enough to improve learning practices. Furthermore, explained that research and development is a process or steps to develop a new website or improve existing websites that can be justified. In developing the design, the researchers chose 4-D model for the development of 4 instructional stages of define, design, and develop and disseminate a model (Thomas *et al.*, 2015). It is also modified by Salim and Tiawa (2014) as definition, design, development and deployment.

In this study, it used multiple learning simplification regression modeling. The variables used in this study are the independent variables, e.g., expediency ($X1$), display ($X2$), operation ($X3$), web speed access ($X4$), knowledge adsorption ($X5$) and aspects of interaction ($X6$), Meanwhile, the dependent variable is the quality of instructional media (Y).

In this case, the researchers developed learning media in the form of e-Learning. The instruments used are valid instruments, practicality instrument and effectiveness instruments of the website-assisted learning media. The collected data were analyzed using regression analysis of ordinary least squares method with e-Views Version 4.1. The research was involving students of engineering courses at Faculty of Engineering, Universitas Teknologi Yogyakarta (UTY). The research was conducted within 7-19 December 2016.

RESULTS AND DISCUSSION

From the data analysis, it is obtained information about the test results of the study. There were 20 students from total 24 students who completed the test with the percentage of completion 83%. From the student response, it showed that, average percentage of students responding is 98%. Thus, the data meet the criteria that have been previously described. It showed that the use of the simplification method and e-Learning Model can improve student understanding about the engineering course learning as explained above. In addition, the presented media also can be used in the process of learning as a learning media with a good quality that supported by the developed learning tools.

For the OLS regression results, it found that quality of learning media are influenced by expediency, display, operation, web speed access of access, adsorption aspects and interaction in the virtual class. The summary of the regression result is showed in Table 1 to explain the effect of independent variable and the interaction of instructional media.

The results showed that there was a partial influence on the expediency, display, operation, web speed access of access, adsorption aspects and interaction are tested toward learning media with 0.05 significance level. All variable are jointly evidenced from F test that earned less than significance level of 0.05. The summary of the testing result is showed in Table 1. The regression analysis result showed that the expediency (X1) has a positive effect on the quality of instructional media with the probability of 0.0413 which below the α-value 0.05. This shows a direct relationship between the expediency on the quality of instructional media. It means that the expediency will increase the quality of teaching media (Kolb, 2014).

As for the aspect of web display (X2), the regression analysis result showed that the display in the website has influential effect on the quality of media with α value of 0.05. This shows a direct relationship of the display on the quality of instructional media. It means a higher quality of instructional media can be increased through better
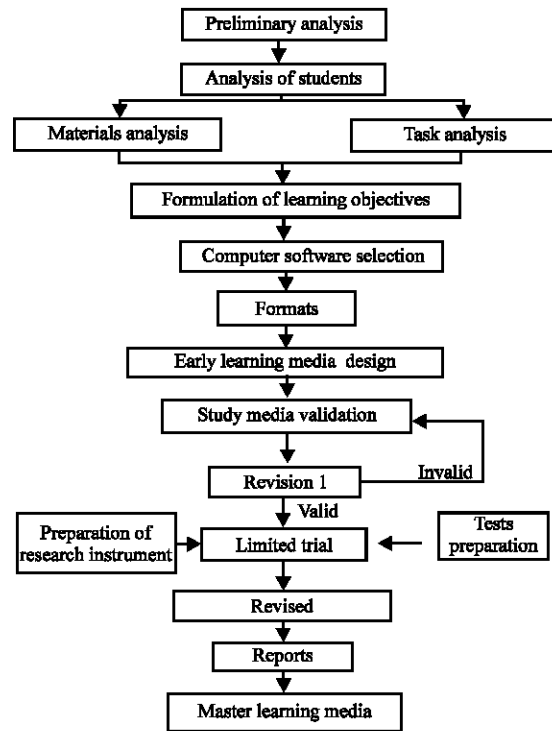

Fig. 1: Flow research development by using 4-D Model

Table 1: Regression analysis

Variables	Coefficient	SE	t-statistic	Prob.
Expediency	0.004115	0.051816	0.073720	0.0413
Web display	0.303660	0.050367	11.961380	0.0000
Operation	0.095413	0.053725	1.775946	0.0473
Web speed	0.067613	0.036930	1.693281	0.0320
K.Adsorption	0.186749	0.055548	2.624801	0.0004
interaction	0.072794	0.024561	2.106260	0.0365

R^2: 0.770598, Mean dependent var: 3.795000, Adjusted R^2: 0.764943, SD dependent var: 1.003499, SE of regression: 0.476062, Sum squared resid: 42.96712, Durbin-Watson stat: 2.063982, Second-Stage SSR: 44.96712, Instrument rank: 8, Prob. (J-statistic): 0.000000

display of website. In this case, the quality can be associated with the appearance and performance of how the website can present easy-to-understood color and position (Fig. 1).

In the operation of learning media, the quality of media is very important and has been investigated here (Greenfield, 2014). In the results of this analysis, it indicated that there are three things that are important in the compatibility of operation and learning media (Buckingham, 2013; Bunch, 2013). Firstly, as web-based website, the operation can be carried out in various places and the users can use it more easily. Secondly, the operation is considered easier if the website was can give tutorial to help the users to resolve technical issues in using the media. Third, it is also useful to measure how quickly users become proficient in the use of the website.

In this study, the regression analysis showed that operation (X3) has influenced the quality of instructional media with α value of 0.05. This shows a direct relationship between the operation and quality of instructional media. In addition, a good operation means higher quality of learning media. Aspects of the operation are generally associated with the appearance and performance of instructional media and how it can be used easily by the user. In addition, it is also can assist the user to use the media quickly.

As an educational website, it is necessary to measure the level of the speed and make it easier for data to students and combined with monitoring and evaluation. When many users accessing in same time, there is a probability that the site becomes slow and it requires improvement in the speed access. For the web speed access, the regression analysis showed that the web speed access (X4) affect the quality of instructional media with α value of 0.05. This shows there is a direct relationship between the web speed access and quality of instructional media, i.e. if the web speed access is good then the media is considered to have high quality. The web speed is important component in developing a system of teaching quality (Greenfield, 2014).

For other variable, the knowledge adsorption (X5) can affect the quality of media with α value of 0.05. This showed a direct relationship between knowledge adsorption on the instructional media. It is supported by the insertion of Adobe Flash in the website as animation features with action script in the webpages. This program can be used to develop MPI support for animation, photo, image, text and sound (Hafner, 2014).

In a virtual classroom, it is important to measure the effect of interaction. It can be seen that the interaction are shaped by teacher activeness in providing services to the students (Salmon *et al.*, 2015). In addition, the teacher readiness to interact also improves the quality of student interaction and participation in the virtual classroom (Peppard and Ward, 2016; Yilmaz, 2017). Teacher must actively collecting data from students to interact better and also be able to become an example of positive interaction to foster student interest (Hamid *et al.*, 2015).

In addition, it also found that interaction (X6) affect the quality of the media quality with α value of 0.05. The quality of the interaction of media can be improved through better interaction to create a good atmosphere of learning. The classroom interaction can be happened between a person and their environment and happen anytime and anywhere (Salim and Tiawa, 2014).

Media-based learning approach is an important component in developing a system of teaching quality (Gikas and Grant, 2013). According to Bunch (2013) learning media in a classroom is everything that can be used to deliver a message and evaluate the quality of the message to stimulate the student mind, feeling, concern and interest to achieve the learning goals in limited time.

CONCLUSION

Virtual classroom can handle the activity and specific issues such as the interaction and participation in class. However, with limited time and infrastructure, online educational services it must have quality standards, processes, procedures and rules in order to have a referral service in education and consulting services with the teachers and other staff. In this case the virtual classroom management is required for the implementation of better online education website to provide the greatest benefit to students in improving their competence and provide greater access to training, seminars and educational training activities more transparent and accountable.

IMPLIMENTATIONS

Students with difficulty in applying the e-Learning must consult to the operational staffs and get guidance. Even though the e-Learning has provided tutorial, however, students with lack of knowledge also have difficulties to resolve the issue. Such issue is the limit of their learning and it is become teacher task to assist the students in their virtual classroom.

The website design can lead students to find the optimal solution to this problem when they were able to ask to the teachers to identify the issues that are defined not actually part of the problem. However, students also still face a trouble in catching engineering terms because it is rarely discussed in class and not given concrete examples. Therefore, it is necessary to combine the constraints formulations through the learning simplification model. However, this is not always the case.

RECOMMENDATIONS

This study can be a recommendation for teachers to provide media-assisted learning website with high quality of instructional media to match with learning objectives and student ability. In our study, it has contribution by introducing the expediency approach and simplification of learning method to increase student knowledge adsorption and included the procedure for solving complex learning to make the learning process to be simplified in logical manner and help the teacher and students to improve their understanding about the classroom situation.

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