THE IMPLEMENTATION OF MASSIVE OPEN ONLINE COURSES (MOOCS)-BASED E-LEARNING SYSTEM FOR COLLEGE LEVEL LEARNERS

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Abstract **-** This research aimed to find out how the implementation of MOOCs-based e-learning system was as an attempt to provide equal access to education at higher education level in Indonesia and to describe the user profile of MOOCs based e-learning. This research used a descriptive quantitative method, and the subjects of the research were 30 MOOCs participants drawn randomly. The design of the MOOCs-based e-learning implemented had following features. Those were a) Bahasa Indonesia content; b) responsive media interface that can be accessed from a variety of devices; c) the use of short duration video content to facilitate buffering process; d) the use of interactive multimedia content; e) the use of social learning principles through the feature of discussion forum; and f) the use of gamification principles through the provision of badges for participants. The results of this research indicate that MOOCs-based e-learning system has the potential to improve the equal access to higher education with several indicators. First, the majority of participants are females. Second, the latest education of most users is high school or vocational high school. Last, most have been working as employees.

Keywords: e-learning, Massive Open Online Courses (MOOCs), educational equality

I. INTRODUCTION

Nowadays, science and technology have been developed rapidly. This development has caused the emergence of information age which leads to a knowledge-based economy. It is a mode of the economy that relies more on ideas instead of physical abilities, and the application of technology instead of the processing of raw materials or cheap labor exploitation (The World Bank, 2003).

This change of production pattern in the economic sector has impacted the changes in the labor market. The knowledge-based economy requires a workforce with high ability. For example, it requires the ability to use and apply devices and ICT applications, the ability to speak in foreign languages, and so on. Considering this global economic conditions, then improving the quality of human resources particularly through education should receive special priority in the national development agenda.

In the document of Initial Design of National Mid-Term Development (RPJMN) year 2015-2019 (BAPPENAS, 2014), it is said that access to higher education has not been evenly distributed and the financial constraint is the main reason. Economic hardship has made people prefer to work and meet the economic needs rather than to continue study to the higher level. The other reason is the geographical constraint. The development of human resources concentrates in certain areas, particularly in big cities in Java. Meanwhile, in other areas the quality of education is low. Besides the quality constraint, the quantity is also not evenly distributed compared to the number of people who are in the age of university students.

The effort that can be done to solve this problem is by exploiting the development of communication and information technology in education. Information and communication technology enables learning to take place not only in the classroom. In this case, the expansion of educational services is a top priority. Information and communication technology can bridge between instructors and students that are separated by distance. In addition, information and communication technology can deliver learning that is open to everyone, free, and flexible in time.

According to data released by Internet World Stats (2015), the number of Internet users in Indonesia had reached 71,9 million users or about 28,1% of the total of population of Indonesia. This puts Indonesia as the fourth country with the most Internet users in Asia after China, India, and Japan. The Association of Indonesian Internet Service Provider (2014) predicted that by the end of 2014 the number of Internet users would reach 107 million users from 83 million users in the previous year. This significant increase could be a good prospect for the development of education in Indonesia especially in holding open distance learning.

Massive Open Online Courses (MOOCs)-based e-learning system enables open and massive access to education with more efficient cost. Xu, Wijaya, and Assegaf (2015) said that the potential benefit that could be adopted by Indonesia with the MOOCs-based e-learning system was its ability to overcome the obstacles of the geographic and demographic condition. This is in line with the research conducted by Hollands and Thirtali in Belawati (2014) in 39 universities in the United States. They suggested that the main goals of the institution in conducting MOOCs were to expand the range and access and to improve learning outcomes, learning innovation, and researches in learning.

E-learning stands for electronic learning. It is a learning supported by the use of digital tools or digital contents. Munir (2009) suggested that the term e-learning could be defined as a form of information technology applied to education in the form of the virtual world. On the other hand, Rosenberg in Caporarello and Sarchioni (2014) defined e-learning as the use of Internet technology to

deliver a broad set of solutions for increasing the knowledge and improving the performance.

E-learning application in education has many benefits. Baldwin-Evans in Caporarello and Sarchioni (2014) recommended e-learning for its flexibility, interactivity, and efficiency. More broadly, the important success factors of e-learning were many. Those were flexibility in time management, active participation of each member, control mechanism that assured the learning process, quality, and structure of learning materials, the use of standardized and developed technology, instructor's teaching styles and learner's learning styles, learner's learning motivation, learner's technical competence and organizational support of e-learning activities (Selim in Caporarello & Sarchioni, 2014)

There are two ways of implementing e-learning, namely asynchronous and synchronous. Asynchronous e-learning is often used as content management system where users access information without collaborating in real time (Nichols in Madar & Wills, 2014). On the other hand, synchronous e-learning is designed for online users that collaborate at the same time (Stafin in Madar & Wills, 2014). Meanwhile, Madar and Wills (2014) stated that for the effectiveness of the implementation, factors like technology, pedagogy and individual had to be considered.

Massive open online courses (MOOCs) are online lectures that aim to increase participation and open access through MOOC website technology. It provides free access to high-quality learning materials that participants from around the world can create, research, and share the resources of open education (Abeer and Miri, 2014). MOOC has several important characteristics, namely transparent, participative and distributive as described by Baturay (2015). Participation in MOOC is free and open to everyone who is connected to the Internet. Thus, a user is given the freedom to choose the course they are interested in without restriction. Moreover, MOOC is naturally participative. It allows users to contribute and interact with other users which enrich the learning process in it. Then, MOOC's distributive nature is rooted in a connectivist approach that considers knowledge needs to be distributed. It involves social learning environment that every participant can interact with the teaching materials as well as with other participants. The available materials usually become the starting point for discussion.

MOOC designs can be classified into several types as stated by Daradounis, Bassi, Xhafa, and Caballe (2013). First, xMOOCs is based on behaviorist pedagogical model that views learners as knowledge consumers and utilizes video tutorials and graded assignments. Second, cMOOCs is a connectivist pedagogical model that views learning as the process of generating the network of knowledge and utilizes online and social tools. Third, quasi-MOOCs is a web-based tutorial consist of asynchronous learning resources that do not offer the social interaction of cMOOCs or the tutorial based format of xMOOCs.

In general, MOOC learning uses several features according to Gringer in Baturay (2015). First, learning video. It is usually divided into several sections with the duration between 5-10 minutes per video. Second, assessment. It uses automatic scoring of multiple-choice questions and peers review assessment in which participants assess each other's work based on the specified criteria. Third, forum. The participants can interact with other participants and with the instructor. Fourth, readings. It is available online or provided by the instructor. Fifth, live video sessions. It is an enrichment that participants can interact directly through live video conference. Sixth, social media. The participants can continue the discussion on the social media platforms such as Facebook or Google+.

Chen (2013) argued that MOOC had advantages. There were accessibility, users' comfort, and lifelong learning experience. It offered open and free learning which made it easy for people from different backgrounds to access it. Its classes were open entry and open exit so that users felt more comfortable knowing that there were no consequences if they could not finish the courses. Moreover, as MOOCs were open to everybody with no restrictions in age or educational background, it promoted lifelong learning experience which could increase the quality of human resources.

However, MOOCs delivery is considered to lack tutor involvement and feedback. It is because it is intended for thousands simultaneous participants and requires the use of automated tools to compensate for the lack of human attention. Moreover, MOOCs' assessment employs peer-graded or computer-graded evaluation which lacks the necessary expertise. Therefore, learners receive limited feedback from human tutors (Daradounis, Bassi, Xhafa, & Caballe, 2013).

Based on the issues described, researchers conduct research by developing MOOCs based e-learning system as an effort to provide equal access to higher education in Indonesia. Thus, this research aims to describe the implementation of MOOCs based e-learning system and the users' profile based on their age. This research describes the implementation of MOOCs-based e-learning system which includes four aspects. Those are display, interactivity, accessibility, and enrichment. In addition, it also describes the user profile of MOOCs-based e-learning that is implemented.

II. METHODS

This research uses the descriptive quantitative method. The population is all participants of MOOCs-based e-learning system whose age is between 18-30 years old. It is an ideal age to follow higher education. Moreover, 30 people are taken randomly as the sample. The instrument used is validation sheets given to expert to assess the implementation of the e-learning system. The stages of the research are shown in Figure 1.

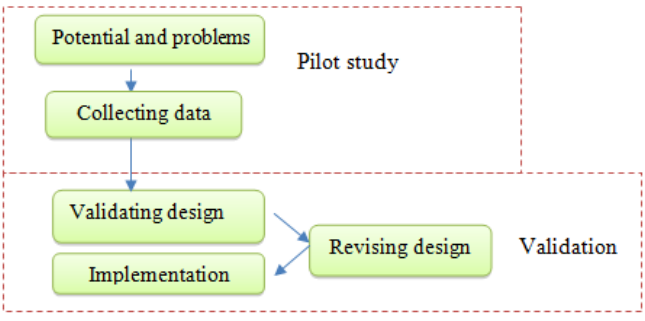

Figure 1 Stages of Research

In the pilot study, the data are collected through literature study and field study. The researchers conduct field study by distributing the questionnaire to find out the individual response on the existing MOOCs-based

e-learning such as coursera.org, edx.org, futurelearn.com, and moocs.ut.ac.id. It results in a review that can be used as a basis for developing MOOCs-based e-learning. In addition, based on the analysis of the field study, it can be concluded that the majority of MOOC users still experience problems in accessing the courses. It is because many of them are not free. Therefore, it is difficult for users to access the information they need. Then, the product trial is also conducted for the respondents from various regions who have access to the Internet. This MOOCs-based e-learning system is an open course so anyone can access this program.

The product validation is conducted by consulting an expert on learning media to assess the feasibility of the e-learning design. The instrument used was validation sheets which used some criteria. The details of the assessment aspects are in Table 1-4.

The data analysis techniques used in this research include data analysis of product validation sheets and users' analysis of MOOCs-based e-learning system. The former involves descriptive analysis to explain the results of the

Table 1 Assessment Criteria for Interface Design

No	Component	Assessment			Suggestion
		Good	Average	Poor	
1	Matching color				
2	Clear and readable font size				
3	Language structure				
4	Layout of features on website				
5	Layout design interface of website for online learning media				
6	Usage of pictures (matching illustration and content)				
7	Video view				
8	Graphic				
9	Esthetic of interesting and clear e-learning banner				
10	Easiness of using website navigation				
11	Menu categorization				
12	Hyperlink				
13	Logo name				

Table 2 Assessment Criteria for Interactivity

No	Component	Assessment			Suggestion
		Good	Average	Poor	
1	Usefulness of discussion forum				
2	Usefulness of video				
3	Collaboration in learning				

Table 3 Assessment Criteria for Accessibility

No	Component	Assessment			Suggestion
		Good	Average	Poor	
1	Easiness of remembering indoversity.com as the domain name				
2	Easiness of access website				
3	Easiness of logging in to the system				
4	Speed of video streaming				
5	Easiness of understanding the quiz delivery				
6	The access of website from all over Indonesia				
7	The access of website for anytime				
8	The access of website for anyone (regardless gender and age)				

Table 4 Assessment Criteria for Enrichment

No	Component	Assessment			Suggestion
		Good	Average	Poor	
1	The knowledge is suitable with competency unit of higher education				
2	The language use is easy to understand				
3	The assignments and exercises are adequate to help attain competencies at higher education level				
4	The assignments and exercises are suitable for competency units of higher education				
5	The materials are organized in systematic arrangement				

validation of the e-learning design and to give input for improvement. Moreover, the latter is used to find out about the equality of access to higher education based on users' age, gender, educational background, employment status, and residential area.

III. RESULTS AND DISCUSSIONS

The MOOCs-based e-learning system is implemented by using Wordpress content management system. Wordpress is a web-based content management system with an open source license in which the program source code is free to be viewed, studied, developed and redistributed based on certain terms and conditions. This facilitates the development team in developing the features needed. The features developed include learning management system in the form of plugins and themes. The development of the plugins and themes is intended to make the e-learning system flexible to be installed in other systems if it is required. This web-based application also required hosting server and domain to be accessible through the Internet. The specifications of the domain and the web hosting for the system are described as follows:

Domain Name: indoversity.com
Storage capacity: 10 GB
Bandwidth transfer: unmetered
(for access from Indonesia)
Apache version: 2.4.17 (UNIX)
PHP version: 5.5.30
MySQL version: 5.5-community
Operating system: Linux

Once the application is installed on the hosting server and could be accessed through the Internet, the validation test is conducted to validate the design of the MOOCs based e-learning system, which is performed by a learning media expert. From the results of the validation test, it is found that the total score for the whole aspects of the learning media assessed is about 52%. This score is in the average category. It means that the MOOCs-based e-learning system developed is appropriate for trial with some improvements.

The MOOCs-based e-learning system that has been developed was assessed by expert on learning media in terms of its interface design, interactivity, accessibility and enrichment. The results are illustrated in Figures 2.

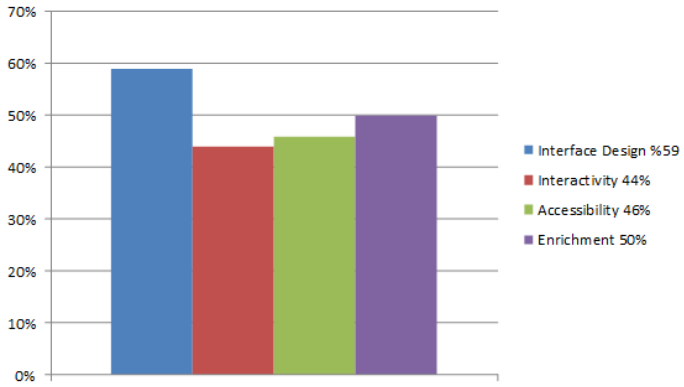

Figure 2 Results of Validation by Expert

For interface design aspect, the validator gives the score of 59%. According to the validator, the media developed has quite good coloring, font size, language structure, layout, banner, and logo. The use of pictures and graphics is also quite good. As for the use of video, categorization, and links are considered sufficient. Then, the quality media is important for knowledge creation and generation which affect the overall effectiveness of the e-learning system.

For interactivity aspect, the validator gives the score of 44%. The availability of discussion forum is the positive value of the media. Meanwhile, the video interactivity and learning collaboration are considered to be sufficient. According to Guardia, Maina and Sangra (2013), design for collaborative learning should include not only discussion forums but also teamwork activities which promote activities and tasks in which collaboration is a must or an added value.

For accessibility aspect, the score is 46%. It is by considering that the domain name (indoversity.com) is easy to remember. Then, the website could be accessed anywhere and anyone (regardless of gender and age). On the other hand, the validator considers that the access to the entire website, login to the system, and quiz delivery are not good enough. Likewise, video loading speed also needs to be increased. Overall, the validator considers that the website is not accessible smoothly from all over Indonesia. Therefore, the technology used should take into account regarding infrastructure issues faced by learners and provide alternatives to access the learning system.

For the enrichment aspect, the score is 50%. The system needs an additional abundance of applications. It should encourage learners to explore newly available learning tools that support rich interactive and highly audiovisual content (Guardia, Maina, & Sangra, 2013). Additionally, social networking can also function as enrichment that can foster social interaction between learners which allow them to share their work with other learners and facilitate exchanging information (Guardia, Maina, & Sangra, 2013).

The validator sees that the learning materials used in the MOOCs-based e-learning system contain knowledge that is in accordance with the competency units of higher education, and the language is also easy to understand. However, the assignments and exercises given are not suitable for the competency units of higher education. The validator also suggests that the researchers add tutorial contents and to give acknowledgment in the form of certificate which states the participants have attended the online learning. Thus, there will be the commitment between participants and instructor. From the aspect of the display, the validator suggests that the color of the font and the background should be adjusted.

Furthermore, an analysis of the user profiles is required to test the ability of the system in solving the problem of equal access to higher education in Indonesia. The indicators analyzed include users' domicile, gender, latest education, and profession. Based on the analysis of the user profiles registered in the e-learning system, it is found that 81% of users are from West Java. The number of users from Jakarta, Banten and South Sulawesi are 3% each. Meanwhile, Bengkulu, South Sumatera, East Kalimantan, and South Kalimantan have 2% each. Additionally, Bali and Yogyakarta are 1% each. The data show that the e-learning system has reached at least 10 out of 34 provinces in the west and central regions of Indonesia. However, the majority of the users (81%) is in West Java. This happens because of insufficient time, budget and available human resources

to disseminate the program in other regions especially those with low rates of higher education participation. Alternatively, the socialization is conducted by using social media sites. Therefore, most users are only reachable through social media. Figure 3 shows the data visualization of users' domicile of the developed MOOCs based e-learning system.

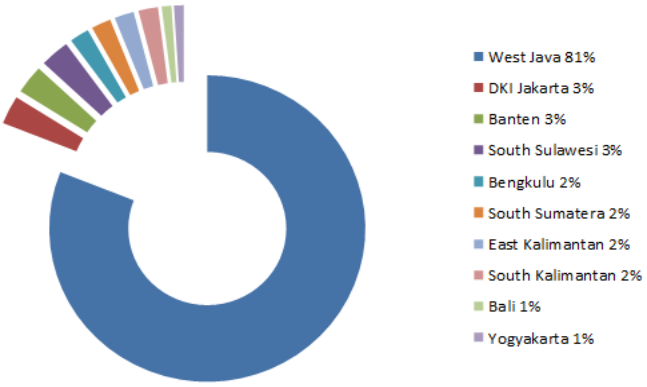

Figure 3 Users' Domicile

Moreover, based on the analysis of the user profiles, it is found that 39% of users are males. Meanwhile, 61% are females. Figure 4 shows that the majority of users are females. This indicates that the e-learning system developed can attract female learners to access the system to get the education and gain knowledge. According to OECD (2011), in many developing countries, female students still have low achievement in education. Hence, gender equality in education is not only to improve equality of employment opportunities but also to help to avoid early marriage, reduce the average fetal deaths, and improve health and education for future generations. In other words, MOOCs can increase females' participation in education especially in developing countries such as Indonesia.

Figure 4 Number of Users Based on Gender

Based on the analysis of the user profiles, it is found that 52% of users are graduates of vocational high schools or equivalent. 38% are graduates of senior high schools. Then, 8% have a bachelor degree, and 2% have diploma degree. It is shown in Figure 5. The high number of users of high school graduates is consistent with the data obtained by Asosiasi Penyelenggara Jasa Internet Indonesia (2014). It described that the number of Internet users in with high school as the latest education was about 64,7%. Users in this category are the primary target for this e-learning system.

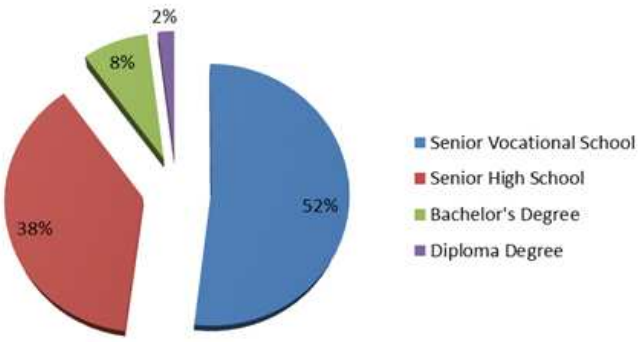

Figure 5 Number of Users Based on Their Latest Education

For the user profiles, it reveals that 44% of the e-learning users work as employees. Then 30% are housewives, and 13% are entrepreneurs. Moreover, there are also 4% of students and 5% of other professions. The data is visualized in Figure 6.

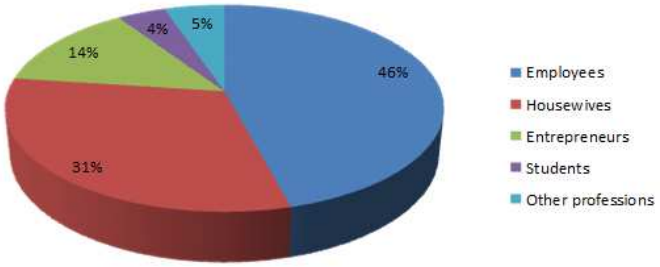

Figure 6 Number of Users Based on Profession

Similarly, Asosiasi Pengguna Jasa Internet Indonesia (2014) also found that 55% of Internet users were employees and entrepreneurs. As suggested by BAPPENAS (2014), the access to higher education in Indonesia has not been evenly distributed which is mainly due to financial constraint. Economic hardship makes people prefer working to fulfill their needs instead of continuing their education to a higher level. The high number of users who work as employees shows that people in this category are still interested and still look for the opportunities to try new things and one of them is following an e-learning.

IV. CONCLUSIONS

The application of this MOOCs-based e-learning system is assessed based on four aspects. Those are interface design, interactivity, accessibility, and enrichment. There is no need for significant improvement regarding display. However, the other aspects still need to be improved. For interactivity aspect, the quality of multimedia interactive contents needs to be enhanced, and the students' participation in the discussion forum also should be increased. For accessibility aspect, efforts should be made to make learners easier to access or play the video. This aspect is highly influenced by the quality of Internet access of the users. Lastly, for enrichment aspect, it is suggested that the assignments and exercises given are in line with

the competency units of higher education. However, the number of tutorial contents should be increased.

Then, the user profiles are analyzed based on four indicators, namely domicile, gender, latest education, and profession. The majority of users are in Java Island dominated by female learners. They are high school graduates and work as employees. In addition, students' perception is one of the important aspects that should be considered in the development of implementation of each component of open distance learning. Hence, further study to measure students' perception in using the MOOCs based e-learning system is required.

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