MOOCs phenomenon and role in STEM-related education and EFA movement

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Abstract. Education is a major aspect of national development. Quality education is a component of the UNESCO Sustainable Development Goals (SDGs). One of the improvements in the aspect of quality education is the equal distribution of education through the Education for All (EFA) movement. Good infrastructure must support this motion, particularly the application of technology in teaching. Education is part of the educational equity system because most individuals are acquainted with technology, particularly smartphones. Massive Open Online Courses (MOOCs) are one of the e-learning models that evolve in a huge community and can be accessed by everyone. The EFA movement can be carried out well through MOOCs, although there are still multiple types of barriers encountered. The present article was a systematic review of the literature with the goal of defining relevant elements of the application of the trend of MOOCs to STEM-related learning. The methodological process was a systematic search of an article that identified, selected, evaluated and analyzed the texts relating to the object of the study.

1. Introduction
In recent year, the need for higher education in society increases with the demands of the Industrial Revolution. The university entrance fee is very costly now, so not everyone can join it. This situation is of concern as there are still many low-educated societies. Nearly 40 percent of Indonesian employees are only primary school graduates and have not been educated in formal education for 9 years [1]. The Human Development Index published by the United Nations Development Program (UNDP) emphasized that Indonesia reached a score of 0.694. This value positions Indonesia in the medium category of human development, 116th out of 188 nations [2]. Central Bureau of Statistics of Indonesia emphasized If you observe the financial status of household organizations, the average duration of college life can only reach 8.3 years or full junior high school (SMP) education [3]. This situation is an issue for the government, given that work rivalry is rising, particularly with the AEC (ASEAN Economic Community), AFTA, etc.

The government seeks to ensure that education is evenly distributed to reach the 3T region (left behind, front and out). Various efforts have been made, such as scholarships, implementation of the SM3T program, The Indonesian Smart Card, School Operational Assistance Fund (BOS), etc. One program being developed as an attempt to distribute education and regional development is the implementation of smart cities in each region. Smart City is a program anticipated to assist accelerate
growth. Smart Education is one element of Smart City that needs to be applied as an attempt to distribute education to distant regions. Several cities have now implemented the idea of a smart city to enhance the quality of life of society, including in the field of education [4]. Technology-enabled learning is an alternative in an attempt to promote smart cities and education for all.

Electronic learning or e-learning is a study medium that is often used because it has benefits and helps in the notion of intelligent education. In addition, the advent of the Massive Open Online Courses (MOOCs) phenomenon is very helpful in the delivery of content and can be accessed by all customers. Despite this, the Massive Open Online Courses (MOOCs) have spurred significant discussion and debate in both government and academic discourse [5]. This discussion is connected with the status of MOOCs that are more engaged in non-formal education. The presence of MOOCs can assist to create an educational culture in society, namely the spirit of learning about the information they want to master. There are distinct design approaches and interpretations of e-learning, mainly involving differences in educational strategies and pedagogical models used with technology [6].

According to the Speed test Global Index, Internet connection in Indonesia is 112th in the globe with an average file download speed of 17.02 Mbps as of May 2019, whereas the average file upload velocity is 10.44 Mbps, Indonesia is 123rd in the globe. [7]. Indonesia is ranked 8th in Internet connection velocity in ASEAN. This situation is very unfortunate because it is still lower in terms of velocity than in other ASEAN nations. Internet link velocity is highly influential in community-sensitive technology access. Low Internet speed can, therefore, decrease the use of e-learning in Indonesia.

A lot of research has been performed on the implementation and advantages of e-learning. Moiz Uddin Ahmed et.al emphasized a generalized e-learning model that can meet learners ' requirements under the accessible technology infrastructure [6]. Straková and Cimermanová conduct research on the growth of teacher abilities through the Virtual Learning Environment (VLE). Straková and Cimermanová emphasized that enhanced reflection supplied student teachers with such a deep stimulus that their strategy to their own reflection showed an important distinction compared to frequent face-to-face reflection [8]. Online learning with e-learning has quality and in regards to frequent learning interacts optimally with learners.

The benefit of applying a virtual learning environment is that it can fully find out the outcomes of the assessment. A virtual community of practice for learning at a distance can demonstrate its value to the organization through systematic assessment [9]. VLE offers facilities for consumers to use the services supplied so that the anticipated competition can be optimally achieved. Research by Nati Cabrera & Maite Fernández-Ferrer on comparative studies between Traditional and Open University Educational Technology Experts. They emphasized that traditional university educators are worried about problems not even raised by virtual university professors, and vice versa [10]. While educators at the Open University of Catalonia highlighted functions such as course leadership, resource creation, instruction, support and feedback, all significant tasks in setting up an internet teacher profile based on the role to be played [10]. The presence of e-learning in higher education is still an issue for educators, although it is very useful in the globe of education, particularly in enhancing student competition.

However, the study carried out did not embrace the wider community. Many studies focus on formal education, such as higher education and universities, but there were not many studies linked to the implementation of technology to the industry in non-formal education. Although the development of education technology for teaching can already be used by society. Although the community's instructional demands are very big, including satisfaction of the government-initiated education equalization program. The community currently requires equal distribution of education to the communities and can be felt by all. The Education for All (EFA) Movement is part of the attempt to equalize education, particularly with the assistance of technology to accelerate the accomplishment of educational equity goals. E-learning for society is a strategic move, and the state is also working on a smart city program to enhance infrastructure and public services.
We suggest reviewing the concept of implementing e-learning in society. The implementation of e-learning to the society can assist in the attempt of equitable education so that the community can receive a proper education. Although the notion of e-learning is restricted to non-formal education as implemented through MOOCs. MOOCs provides general content that the public can access and choose for free. There are materials and exams just like studying at a university and at the end of the day, a certificate will be distributed as a sign of fleeing the material.

2. Method
The method used in this article is the literature review. Review articles can cover a broad variety of topics at different rates of completeness and comprehensiveness based on literature analyzes that may include study results [11]. The application of literature review as a mechanism for reviewing and responding to the problems revealed in this paper. This document is a component of preliminary research undertaken to initiate a survey, particularly the development of an e-learning prototype that can be used by society. The construction of the e-learning prototype will take place after preliminary research on the usefulness, possibilities, and difficulties of e-learning for society.

3. Result and Discussion
3.1. The Role of E-learning in learning
The learning method in classrooms needs instruments to meet skills in order to achieve an ideal learning outcome. Learning media is presently witnessing a fast rise. E-learning is one of the learning media that has developed from the idea of e-learning to digital learning. Digital learning is a development and portion of the Learning 4.0 idea that can be applied to higher education. Future technology-enabled learning has also been intended through the smart learning idea and is expected to be launched in 2020. In Figure 1 below, it defines the development of e-learning.

![Figure 1. E-learning has undergone growth so far [12]](image)

Learning media innovations must be created and massively socialized by applying smart learning. The community must also be ready to be able to apply technology because some still use technology to stutter. Even though e-learning is momentarily implemented in the educational environment / higher
education in fact. Students already understand technology optimally on average, so the implementation of e-learning also has a beneficial effect in supporting learning in colleges or universities.

The design of e-learning more extends the notion of the learning management system (LMS). LMS is more focused and has a clear notion of electronic learning so that it can work as face-to-face learning. E-learning offers a location for uploading content to each chosen course. Besides providing debate and chat rooms between learners and educators to discuss topic questions or other issues. E-learning offers quiz questions, mid-term, final semester tests, assignments and other types of assessment to determine the skills of learners.

Applying technology to teaching is a component of responding to problems in the 21st century that emphasize too many abilities to master. Some abilities such as critical thinking, communication, science processing abilities are also highlighted in the teaching of this century [13]. These abilities must be acquired by learners to compete when they are looking for a job. Competition in the globe of the job is very rigorous, namely through the presence of free trade and competition abroad. However, improving student skills should be balanced with improving teacher skills that are more competent and meet the skills taught to learners. Teacher training can have a beneficial effect on teacher learning policies that learners can benefit from [14]. Technology operational preparation is very essential for educators so that it can be implemented in learning. Result of research has shown that the quality of teaching staff can contribute to improving learning results of vocational school students [15]. Thus, E-learning can work efficiently as educators can use it as a learning medium.

Figure 2 shows e-learning at Universitas Pendidikan Indonesia as learning media for students. In this e-learning, lecturers can upload teaching materials that learners can access. Teaching materials can be student reference to enhance student literacy abilities and understanding. It increases the abilities of learners as long as they have to be engaged in continuing to access and learn to use e-learning. However, inactive learners are readily left behind by others.

![Figure 2. E-learning owned by Universitas Pendidikan Indonesia (Captured on June 17, 2019)](image)

E-learning offers multiple types of equipment that learners can use to fulfill the course they have taken. The equipment supplied can be used optimally as learners can be continually self-learning. Thus, lecturers can provide learners with multiple tests/quizzes in order to improve analytical abilities and assess learning results. Virtual learning environment (VLEs) mostly displays multiple-choice questions but can include a wider variety of kinds of evaluation, including true-false, fill-in-the-blank, matching, or numerical manipulation [16]. These facilities were given by e-learning, particularly those based on LMS. This is a system that is prepared to use with virtual ideas to use classroom teaching.
Current development in technology. According to a Strategy Analytics study, the worldwide market penetration of smartphones will hit the 44 percent mark in 2017, rising to 59 percent by 2020 [17].

VLEs still face numerous barriers in their application in schools. In developing nations such as Indonesia, there is still an obstacle to computers and internet facilities [18]. Prasojo et.al performed studies on the barriers that educators face in applying technology. Participants disclosed that colleges need to buy fresh ICT equipment for instructional purposes, connect the wireless network to the Internet and replace older ICT equipment [19]. Facilities are the primary factor in enhancing the capacity and implementation of technology in education. However, less supportive equipment can decrease learning interactions with these techniques. This obstacle must be addressed instantly by the government and associated parties so that technology-enabled learning can be implemented as quickly as possible. Thus, the blended learning model is ideal for educators because of restricted distance and time, because online learning can be accomplished anywhere and anytime [20].

The new socio-technical truth of the 21st century needs student abilities and process abilities linked to technology users [21]. Formal education also utilizes ICT to concentrate on computer literacy, educate learners and report on the internet [22]. Modern learning, therefore, involves technology in every activity. In the 21st century, educators, employees, and students are anticipated to be able to master ICT to promote the process of academic operations in the educational setting.

3.2. Development of MOOCs and Community applications

The Massive Open Online Course (MOOC) has developed as educational demands have risen. MOOCs enables students to choose objects to study and can assist them to react to the motivation of each learner and their teaching preference [23]. Average MOOCs provide free and open use of content as an online teaching scheme. They have emerged as part of innovation by enabling large-scale staff to access online courses by enrolling. MOOCs are created on the basis of growing university knowledge by using distance learning and open resources [24]. In addition, the existence of MOOCs can provide multiple resources to learners outside the university to assist fix learning issues on the campus.

Developing MOOCs is a step forward in the education globe. MOOC provides various courses that can be freely accessed by the public to complement the required competence requirements. Although there are several ideas of MOOC that are paid to assist teaching. Figure 3 is the edX platform for education and learning. EdX offers learners with free access, developing of traditional teaching, the reduction of economic issues, and without space and time constraints. Although there are some courses that have to be paid so that users can access the material unlimitedly.

Figure 3. E-learning in EdX is the Education and Learning Platform (Captured on June 17, 2019)
MOOC also forms part of the notion of equitable education for individuals in the region. This concept has been applied by the Government of Daerah Istimewa Yogyakarta (DIY). The Jogja Belajar is a learning platform created by The Education Communication Technology Center (BTKP) of the Special Region of Yogyakarta. BTKP offers several learning media to promote competency accomplishment. The Jogja Belajar is a submenu that learners, educators, and parents can access as a support for teaching material at college. The JBClass is designed for students, teachers and parents to interact and know the flow of the learning process. The JB Class, however, is an internet class for learners and educators in the DIY Province. Figure 4 is an e-learning showcase created by the BTKP to enable individuals in the DIY region to take advantage of online learning equipment.

![Jogja Belajar As a Community Online Learning Media](Captured on June 19, 2019)

Most individuals have not used the e-learning equipment supplied by the provincial government of DIY. This study associated with the community's use and use of technology is the correct move. Researchers can show the community's requirements and the use of technology to evaluate the community's willingness to face the technological era and promote the implementation of smart cities.

4. Conclusion
From the literature review results, we can draw conclusions include:

a. The role of e-learning can be used by society to enhance expertise in accordance with the content submitted

b. Many individuals have felt technology, but there are still many individuals who have not used it well and there are some individuals who have not been able to adopt technology in their daily life

c. Research on the role and use of technology for society require to be done to create the technology required by society.

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