The Effectiveness of eLearning Usage in Classroom Teaching to Promote Critical Thinking Ability

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Abstract—The use of e-learning has been believed to be a teaching tool to help the learning process be easier, practical, interesting, interactive, and motivating. E-learning is seen as one of the modes of teaching that helps students learn independently over the times and technological advances, so that its use has been widespread. However, its wide use seems to be a concern, where network availability, user access, and users become obstacles in its application in teaching. This study aimed to explore the effectiveness of e-learning usage in classroom teaching process to promote students' critical thinking ability at the Institute of Teacher Training and Education Mataram (IKIP Mataram) - Indonesia, which is a private higher education institution in Indonesia. This study is an experimental research with the design of "one group pretest-posttest design". The research sample consisted of 17 students in the physics education program at IKIP Mataram. Students' critical thinking ability was assessed using the critical thinking ability test instrument adapted from the Ennis-Weir Critical Thinking Essay Test. The data of critical thinking ability were analyzed statistically, where homogeneity, normality, and t-test were conducted. The research result showed that the use of e-learning was effective in promoting students' critical thinking ability. In this study the researchers also evaluated the use of the internet among lecturers in the learning process. The results analysis is explained further in this article.

Keywords—e-learning, classroom teaching, critical thinking ability

1 Introduction

Information and communication technology (ICT) have brought many changes and innovations to various fields. Innovative changes were made in various institutions including educational institutions as a result of ICT. Many institutions use information systems to manage academic and non-academic systems. Some institutions use ICT infrastructure in terms of communication inside and outside of school, implementation of learning, implementation of examinations, learning tools, human resource management, etc. However, one important aspect that is influenced by ICT innovation in educational institutions is the teaching and learning section, in a context more commonly

known as e-learning system. The introduction of e-learning platforms has reduced many difficulties associated with teaching in various institutions [1]. Therefore, Indonesia through the Ministry of Education has encouraged the learning process at the higher education level using the e-learning platform in the teaching process, not least at the private higher education institutions in Indonesia.

Regards to the vital role of the internet in everyday life, educators use the advantages of online learning to develop students' critical thinking. In accordance with the educational approaches for critical thinking and the advent of e-learning in different environments, instructors used various multi-methods as a tool such as laptop, mobile-phone, video to develop critical thinking which they have different applications. Empirical studies show that the implementation of e-learning as a tool to facilitate the learning process and to promote students' critical thinking, but on the one hand, sufficient infrastructure is needed so that teaching using e-learning can be implemented, including internet. This study aimed to explore the effectiveness of e-learning usage in classroom teaching process to promote students' critical thinking ability at the Institute of Teacher Training and Education Mataram (IKIP Mataram) - Indonesia.

2 Literature Review

E-learning involves the acquisition of knowledge and skills using electronic technology such as computers and internet [2], where some or all of the learning content is delivered digitally. Recently the pedagogical dimension of e-learning has become prominent. E-learning consists of all forms of learning and teaching that are supported electronically [3]. Teaching arrangements through e-learning make students far more independent than in traditional settings. In the teaching process in higher education, e learning has an impact on student learning motivation [4].

E-learning is currently used as another option for face-to-face learning, and its use has been sought globally. This has made educators put a lot of effort into helping students to get interactive content that is full of multimedia because it has been proven that it has a significant effect on the learning process. E-learning has been introduced as a tool in the learning process at most international universities throughout the world. Any learning that involves the use of the internet or intranet is called e-learning [5]. A more general definition that, whatever is conveyed, activated, or mediated by electronic technology for the purpose of explicit learning is referred to as e-learning [6]. E-learning has grown significantly as an educational tool as technology has evolved and developed over the years. Interestingly, there is more effort in advancing technology than trying to understand the needs and learning styles of individual learners and instructional designs. The 21st century has seen rapid progress with things like the internet and online learning.

Universities generally aim to provide active learning experiences for students, and conventionally apply various methods to provide learning training that relies on face-to-face interactions. As time goes by and technology advances, conventional learning processes turn to virtual (e-learning). Changes in the structure and lifestyle of society in the 21st century have brought interest in the use and utilization of e-learning. 21st

century learning requires the use of interactive teaching multimode to promote students' critical thinking skill [7, 8, 9, 10, 11], one of which is e-learning [12]. Some researchers agree to make the e-learning system used by students because they believe that this system saves time [13]. Previous studies have shown that critical thinking skills can be improved by e-learning [14]. Moreover, in the context of the process, e-learning has been able to motivate students in learning. To stimulate student learning motivation through e-learning, teachers must explain to students how the online environment can be used, encourage online interaction and collaboration among students, monitor online interactions, provide feedback, and construct interesting online teaching materials [15]. All of these approaches can be important tools for developing new strategic teaching plans that can help lecturers to influence students' motivation levels. Wlodkowski [16] claims that "learners learn more using computer-based instruction compared to traditional classroom methods." One possible factor for this seems to be an increase in the level of student participation through interactivity. This results in a higher level of cognitive involvement and perseverance to complete the task.

The main challenge in using e-learning is the initiative to use it by lecturers. It has been recognized that many faculty members are reluctant to accept aspects of technology in the teaching process. Untrained lecturers may face difficulties in using e-learning applications. In addition, to be successful, lecturers in higher education institutions must accept, implement, and adopt the technological advancements offered by e-learning. Such new educational approaches are very important to maintain the quality of teaching programs [17]. Therefore, lecturer training on how to use e-learning to improve teaching practices must be emphasized. Although it has been emphasized, it seems that the lecturers have not fully applied it in the lecture process. Therefore, a study on the effectiveness of e-learning implementing in teaching higher education level needs to be done.

3 Methodology

This study aimed to explore the effectiveness of e-learning usage in classroom teaching process to promote students' critical thinking ability at the Institute of Teacher Training and Education Mataram (IKIP Mataram) - Indonesia. This study is an experimental research with the design of "one group pretest-posttest design" [18].

The research sample consisted of 17 students in the physics education program at IKIP Mataram. Students' critical thinking ability are assessed using the critical thinking ability test instrument adapted from the Ennis-Weir Critical Thinking Essay Test. The data of critical thinking ability were analyzed statistically, where homogeneity, normality, and t-test were conducted. As additional information, in this study the researchers also evaluated the use of the internet among lecturers in the learning process. Respondents involved were 76 lecturers in the faculty of Mathematics and Sciences Education - IKIP Mataram. Face-to-face confirmations and observations were conducted with lecturers in the learning activities. The measured lecturers' perceptions related to the use of e-learning in aspects of supporting the availability of internet networks (SAIN), access to the use of the internet (AUI), encouraging institutions to use the internet (EIUI),

encouraging institutions to use e-learning (EIUE), and organizing training on the use of e-learning (OTUE). The use of e-learning in teaching measures the average use of e-learning in each study program, 52 courses are divided into five groups, namely PDC (personality development courses) as many as 6 courses, SSC (scientific and skills courses) as many as 14 courses, CSC (creative skills course) as many as 28 courses, CBC (creative behavior course) as much as 8 courses, and SLC (social life courses) as many as 2 courses. Four study programs (departments) that are subject to evaluation of the use of e-learning are study programs/departments of biology education (BE), mathematics education (ME), chemistry education (CE), and physics education (PE). Data on the use of e-learning in teaching is confirmed directly to the head of the study program (department) as the person in charge of learning at the study program level. Data were analyzed descriptively qualitatively to further draw conclusions related to the use of e-learning in teaching.

4 Results and Discussion

Statistical test results of the effectiveness of e-learning usage in teaching are preceded by tests of homogeneity and normality as shown in Table 1.

Table 1. The test result of homogeneity and normality

Varian	N	Homogeneity		Normality	
		Levine's TS	***Sig.***	***Kol-Smi. TS***	***Sig.***
Pretest-posttest	17	0.623	0.401	0.094	0.200

The homogeneity test (using the Levine's test) and normality test (using the Kolmogorov-Smirnov's test) of the data showed that the data variants are homogeneous and normally distributed with a significance value of 0.401 and 0.200 (> 0.05).

Table 2. The result of t-test

Group	t-test for Equality of Means			
	t	***df***	***Sig.***	***Mean diff.***
Pretest-posttest	-12.530	32	0.000	-10.344

The results of this study dealing with students' critical thinking ability using the t-test show that the significance value of the test (0.000) is smaller than alpha testing (< 0.05). It means that H_0 is rejected and H_1 is accepted. It can be concluded that there is an increase of students' critical thinking ability between pretest scores with the posttest score after the implementation of e-learning in classroom teaching. The elaboration of the results in this study presented that e-learning usage in classroom teaching can promote the students' critical thinking ability.

The use of online teaching technology has provided increased student critical thinking about the subject matter, namely in terms of providing a means to move low-level learning assignments outside of class time so that limited student contact time can be

used for critical thinking activities, then has encouraged the use of constructivism teaching philosophy by complementing traditional face-to-face activities with opportunities for individual and deep interaction with the subject matter. Online tools provide an efficient means by which instructors can shift basic concept instructions outside the classroom so students are ready to be fully involved in class activities. Expanding student assignment time with subject matter before scheduled class meetings ensures that students are better equipped to take advantage of interactive learning strategies [19].

The results of measurements of the use of e-learning in teaching at IKIP Mataram are provided in Table 3 and Table 4.

Table 3. Lecturers' perceptions related to the use of e-learning in teaching

Aspect	Very Good	Good	Enough	Less	N (%)
SAIN	32 (42%)	24 (32%)	14 (18%)	6 (8%)	76 (100%)
AUI	61 (80.3%)	7 (9.2%)	8 (10.5%)	0 (0%)	76 (100%)
EIUI	56 (73.7%)	12 (15.8%)	8 (10.5%)	0 (0%)	76 (100%)
EIUE	53 (69.7%)	10 (13.2%)	11 (14.5%)	2 (2.6%)	76 (100%)
OTUE	22 (29%)	23 (30.2%)	24 (31.6%)	7 (9.2%)	76 (100%)
Average perceptions	58.94%	20.08%	17.02%	3.96%	100%

Table 4. The use of e-learning in teaching

Department	Courses Groups (% of e-learning usage), N = 52					Average e-learning usage
	PDC (6)	*SSC (14)*	*CSC (28)*	*CBC (8)*	*SLC (2)*	
BE	1 (16%)	2 (14.3%)	1 (3.5%)	1 (12.5%)	0 (0%)	5 (8.62%)
ME	1 (16%)	1 (7.1%)	3 (10.7%)	1 (12.5%)	0 (0%)	6 (10.34%)
CE	2 (16%)	1 (7.1%)	2 (7.1%)	1 (12.5%)	0 (0%)	6 (10.34%)
PE	1 (16%)	2 (14.3%)	2 (7.1%)	1 (12.5%)	0 (0%)	6 (10.34%)

The results of the research on lecturers' perceptions related to the use of e-learning showed that on average 58.94% had very good perceptions, 20.08% were good, 17.02% were enough, and 3.96% were less on aspects of supporting network availability internet, access to the use of the internet, encouragement of institutions to use the internet, encouragement of institutions to use e-learning, and organizing training in the use of e-learning. These results indicate that institutions provide support for the use of e-learning by providing adequate means of support. However, it is noted that the institution needs to be more intensive in conducting training related to the use of e-learning in teaching.

Institutional support does not seem to be in line with the implementation of teaching by lecturers based on e-learning. This indication can be seen in the results of the study (Table 4), where the use of e-learning in each study program is still very low, namely in the biology education study program (8.62%), mathematics education study program (10.34%), chemistry education study programs (10.34%), and physics education study programs (10.34%), and on average no more than 6 courses out of the total 52 courses programmed by students. The main aspect which is a factor in the low participation rate of lecturers who use e-learning in teaching is the skill of using e-learning tools and the preparation of e-learning materials that are integrated with teaching methods, teaching materials, learning tools, and assignment modes to students. Its needs to be addressed

by the institution, because the use of information and communication technology in learning has been believed to be able to improve the quality of academic services and overcome the limitations of learning in the classroom [20]. The use of e-learning as a virtual space can also strengthen students' knowledge and abilities [21]. The use of computer and network technology in e-learning is both an advantage and a challenge for e-learning providers.

The e-learning system has offered many benefits for education providers such as schools and universities, some of which include the e-learning system to reduce the burden and physical activity in learning, upgrade the system to improve the quality of learning management, and improve the quality of the learning process itself. However, in its utilization, there are several obstacles, including technical aspects, accessibility, interactivity, services, awareness and convenience of use. These challenges need to be resolved in order to motivate lecturers and students to use the new mode of learning system, namely e-learning.

Through e-learning, it is possible for institutions to apply distance learning, which is currently also globally applied. E-learning as a distance learning process system will provide many benefits for educational institutions and learning actors (lecturers and students). Arkorful and Abaidoo [22] stated that through e-learning, educational institutions can save routine costs incurred by universities in conventional learning processes. Therefore, the implementation requires the readiness of user competencies in operating e-learning software, converting printed materials into digital or interactive media, and supported by adequate computer, electricity, and internet networks. In the future higher education institutions need to prepare this well in order to keep abreast of current developments in the context of the use of e learning in teaching.

An important finding of this study is that the use of e-learning platforms in teaching can promote critical thinking skills, and should be used massively in the learning process. These results are an extension of previous study findings that the use of multi popular learning modes [23, 24, 25, 26] can be combined with e-learning platforms so that learning is more effective in achieving broader learning goals. However, institutional or university support is needed in preparing the infrastructure, access, and teaching resources who are skilled in their use.

5 Conclusion

The research result showed that the use of e-learning was effective in promoting students' critical thinking ability. In the context of access to the use of e-learning as an institution, the study results show that institutions fully support and facilitate the implementation of teaching using e-learning. However, the number of lecturers participating in the use of e-learning in teaching is still very low.

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