E-learning development in improving students' critical thinking ability

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Abstract

The research paper presented to explore valid, practical, and effective e-learning media. Reflectig the purpose of paper, this study is to improve critical thinking skills, to obtain an overview at high levels and increasing students' critical thinking skills including ability. The hypothesis is as a rational decision-making process on what believed is, through the aspect of providing basic explanations, building basic skills, concluding, making further explanations, and strategies and tactics in the lesson planning course, at the Faculty of Tarbiyah and Teacher Training at UIN Maulana Malik Ibrahim Malang. The paper explained ADDIE development model which included the design, development, analysis, implementation and evaluation stages which reffered research and development (R & D). The data for testing e-learning media in learning and tests of critical thinking skills carried out from fourth-semester students . The study used the One Group Pretest-Posttest Design for trial design. The results concluded the average percentage of feasibility value of the e-learning media from the three validators was 86.6% with very feasible criteria, the critical thinking ability instrument was 79.9% through feasible criteria. E-learning media used in a limited trial that obtained an average score of 82.4% for lecturers and students with practical criteria. E-learning media is improving critical thinking skills effectively which indicated changes in students and critical thinking test presented the results from 56.7 to 81.3. The findings showed that the e-learning media is valid, practical, and an effective criteria to improve students' critical thinking skills.

Keywords: E-learning, learning strategies, critical thinking skills, tactics;

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1. Introduction

E-learning implementation policy is contained in the Education Strategic Plan from the Ministry of National Education (Conference, Jamin, & Mudra, 2019) as part of improving quality, relevance, and competitiveness(Rahayu & Hartono, 2016) which are stated as follows: Taking into account the rapid development of ICT use in various sectors of life (Yanto & Fathurrochman, 2019), the government will continue to develop learning information systems including the development of electronic learning and use of ICT for schooling (e-learning) (Kustandi, 2017). E-learning (Awada, 2016) is also known as distance learning which operates computer technology, internet and computer networks. The same thing was also expressed (Kongchan, 2008) which defines e-learning is communication technology networks and use of information in learning and teaching process. Another term that refers to the same thing, (Abidin, etal., 2020) is online learning or web-based learning. E-learning allows students to study via computer (Kustandi, 2017) where physically lectures are not possible particular places and spur to perform the asynchronous method of e-learning activities and synchronous. According to (Mistar & Embi, 2016) the atmosphere of e-learning can accommodate where students are playing active role in learning so that students design their own material. E-learning is an alternative to learning in various educational institutions and increasing developments in the field of information technology and communication. In additional, infrastructure in the telecommunications sector which supports the e-learning does not only occur in cities but it gradually begun to be implemented in cities at the district level (Thongmak, 2013)

Learning planning lesson (Tavangarian etal 2004) means of learning and thinking exercises, not just memorizing concepts. The learning aspect of learning planning requires a higher level of student thinking High Order Thinking Skill (HOTS) (Yaniawati, 2013).

One part of higher-order thinking (Ross, etal., 2006) states that critical thinking is a thought process which is based on conclusions, to decide and draw, relevant data, including analysis, explaining, hypothesis, arguing, and develop thinking. In 21st Century, critical thinking skills are seen very important (Atiah, 2020) to be trained for students and become one of the main objectives of Indonesian education. The importance of developing this critical thinking ability, the fact is not in line with the conditions of learning in the field at the moment. The results of observations and interviews conducted with one of the lecturers of Learning Planning at UIN Maulana Malik Ibrahim Malang, shows that the learning strategies applied have not facilitated students to practice critical thinking skills, and the methods used are still conventional, the use of technology is lacking so that students experience difficulties in developing their abilities. Conventional learning methods are often applied by lecturers in practicing students' critical thinking skills no longer a solution in the 21st century because the challenges of this century require the use of technology in every learning process (Tavangarian et al., 2004)

The use of technology (Putra, 2019) brings new challenges in the world of education and has a vital role to build 21st-century skills, and that the skills of students in utilizing technology are very important (Tinggi, 2019). So that along with the times, the learning model needs to be modified to adapt to the 21st-century digitalization era, and namely the use of technology.

There are various types of e-learning (Tavangarian et al., 2004) that are applied in educational institutions, but one of them is Learning Management System (LMS). LMS is known as a software, to develop and create web-based online learning stuff, lectures, manage their results and learning activities. Some features of LMS can meet all the requirements of the users in terms of learning. Currently, there are many types of LMS being offered, each type of LMS has its advantages. Edmodo and Schoology are currently very easy to use types of LMS. Edmodo and Schoology are social web that offers the e- learning same as in the classroom for free and is easy to use as social media Facebook

through different forms. The use of Edmodo and Schoology are an alternative form of learning model which is handled to be very good for increasing motivation, solving learning problems, and critical thinking of students. According to Joane Kurfiss (Inch, et al., 2006) critical thinking assessment states that integrates all available information such, question, phenomenon, as the purpose to study a situation or problem to get a hypothesis and conclusion as it can be justified with confidence. The characteristics of critical thinking according to Fisher (2009) consist of two things, first, learning how to ask, when to ask, and what the questions are, second, learning how to reason, when to use reasoning, and what method of reasoning to use. So, someone who thinks critically, then he usually asks the right questions, combines relevant information, efficiently and creatively compiles information, has a reasonable reason for the information held, and conclusions are consistent and reliable so that it can be used for human life and can reap success. Critical thinking is making rational decisions about what to believe and do.

There is one way of learning to emerge face-to-face learning with online learning or e-learning (Tavangarian et al., 2004). The blended learning model is known as learning model that combines online learning and face-to-face learning. Blended learning model improves students' thinking skills (Ahmad Kholiqul Amin, 2017). Blended learning-based learning is beneficial for learning planning, when the lack of time is overcoming on campus and the demands of students to be able to access learning material outside lecture hours (Amal, 2019). The e-learning aspect is developed in the form of a website with components consisting of the main menu, profiles, lesson schedules, materials, videos, and learning animation (Hadi, 2015). Critical thinking skills measured in the research that includes five aspects of indicators, that are (1) simple explanations providing, (2) building basic abilities, (3) making conclusions, (4) giving further explanations, (5) making estimates and integration (Ihsan, etal., 2019). Based on the description and facts above, this paper purposes to test feasibility, effectiveness of e-learning, and practicality to improve level of students' critical thinking skills in chemistry learning.

Method

The research included research and development (Research and Development) (Sugiyono, 2012) namely research used to create products (creations) and the test effectiveness products for research development. The research method entails the experiences of e-learning in particular studied contexts.

The aim of this research was to develop better understanding of using e-learning and analysed experiences of students and faculty members. The product question is in the method of e-learning media, and in learning planning to improve students' critical thinking skills. The development of e-learning media in this study employed the ADDIE development model including the design, analysis, development, evaluation, implementation and evaluation stages (Tegeh & Kirna, 2013).

E-learning product developed is validated by a team of experts (Suliyanto, 2018). Validation data from experts are analysed qualitatively as input to improve the product being developed (Haryati, 2012). The questionnaire data regarding expert responses related to the feasibility of development products were analyzed by transforming the average score of all observed aspects into qualitative sentences with the criteria as in the table 1.

1. Table 1. Eligibility criteria for e-learning media

Acquisition Scale	Category
80-100	Very worth it
66-79	Well worth it
56-65	Decent enough
40-55	Less feasible
30-39	Not feasible

Analysis of critical thinking skills data is divided into 2 parts, the critical thinking skills analysis on each indicator considered as a whole analysis of critical thinking skills. The results of critical thinking skills are divided into 4 categories (Tegeh & Kirna, 2013) as showed in the table 2.

Table 2. Critical thinking skills assessment category

Acquisition Scale	Category
>81,25 - ≤100	Very critical
> 62,50 - ≤ 81,25	Critical
> 43,75 - ≤ 62,50	Less Critical
≤ 25,00 - ≤ 43,75	Very less critical

The samples of this research were fourth-semester students majoring in the Faculty of Tarbiyah and Teacher Training UIN Maulana Malik Ibrahim Malang. In this study, the sample consisted of two classes, namely the experimental class with Edmodo-based e-learning and the control class with conventional textbook-based e-learning.

Results

Learning media products in the shape of E-learning and learning planning learning as a result of this development are validated and tested with a questionnaire. Validation consists of media validation, material validation, and the results of student responses to the products produced. Validation by media experts and material experts are carried out so that the media to be tested is truly suitable for use in research. Development products evaluated by media experts who are E-learning using a questionnaire that must be filled by media experts. The questionnaire consists of an assessment of general aspects, aspects of the presentation of learning, aspects of language feasibility, and aspects of graphic feasibility. The development product evaluated by material experts who are using E-learning questionnaire that must be filled in by material experts. The questionnaire consists of an assessment of general aspects, aspects of material substance, and aspects of learning design.

The validation of the products developed in the shape of e-learning media and critical thinking instruments was carried out by three experts who are competent in their fields. The results of expert validation obtained are listed in Table 3. Results of the analysis stage is the initial stage in developing e-learning media. At this stage, several activities are carried out, namely analysis of problems and needs of students and analysis of basic competencies. Problem analysis is carried out to determine the basic problems in e-learning development. In this step, the researcher generally observes the problems that arise in the lesson planning at the university. Analysis of students' needs innovations in learning planning lessons. The quality of Edmodo-based e-learning media can be reported as the results of expert trials of

media design, material experts, small group trials, and large group trials. The findings of evaluation of each trial phase, it describes as follows: The results of trials from media design expert's basis, and the Edmodo-based e-learning media obtained an achievement level percentage of 87.5%. After being converted to a conversion table, the percentage of 87.5% is in very good qualifications. After completing trials with media design experts and revising products according to input from media design experts, the second expert validation is the material expert trial. Based on the results, evaluations with material experts, and Edmodo-based e-learning media obtained a percentage 94% of achievement level. After being converted to the conversion table, 94% percentage is in a very good qualification.

Table 3. Results of Edmodo Design Expert Validation Analysis

No Item	Statement	Qualification
1	The group features in Edmodo can be operated easily	Very good
2	The presentation of files into folders is simple and not confusing	Good
3	The learning platform used can be used for everyday learning	Very good
4	The features in the Edmodo group can be used for good learning	Very good
5	The selected platform has a display that is easily recognized by symbols and terms	Good
6	The Edmodo group feature can be used as a virtual class	Very good
7	The assignment and quiz features help carry out the assignment assessment	
8	Files saved on the Edmodo platform are not easily lost	Very good
9	The notification feature on the Edmodo account is an effective means of socializing	Very good
10	The discussion forums on Edmodo are not confusing	Good
11	To interact by sending posts can be done easily and simply	Very good
12	Edmodo is a free learning platform	Very good
13	Edmodo Planner helps inform the teaching agenda to be implemented	Very good
14	The appearance of document files in ppt, pdf and video formats presented is not boring	Good
15	Display files from linked URLs that are easy to access and not boring	Very good
16	The Edmodo platform supports teacher to student interaction and student to student	Very good

Based on the calculation of the data above, the assessment is given by the media design expert, if it is matched with the media quality criteria table and results show very good. The table shows that the product does not need to be revised.

The creative thinking and critical thinking are outlined as a higher-order thinking. The cognitive competence is known as the highest thinking ability where students trend as a master in the class. Critical thinking and student's thinking ability can be compared with more than two information, for example, information receiver, the information can be received from outside source they have. If differences and similarities are there, She/he will query or comments for getting information with an explanation. Critical thinking is the development process where individual attempts to get rationally answer queries that person cannot be received answer easily, and where all relevant information is not available (Inch et al., 2006: 5). Critical thinking is an assessment which determines to study condition, all available information and influentially verified and integrated the conclusion, question, phenomenon, or problem to obtain a hypothesis. There are some definitions of critical thinking as mentioned above, a person thinks critically that can be determined with the following features: (1) the problems can be solved with a specific goal, (2) analyzing, generalizing, existing information/facts, and organizing ideas (3) to draw conclusions to solve the problems systematically with the correct arguments.

Students' are using Edmodo e-learning influence and improving critical thinking skills. The differences indicated the students' critical thinking skills in Learning Planning lectures obtained average scores by students during the lecture process using e-learning. In this lecture, students actively express opinions, look for, and solve problems given so that they find new knowledge using forums and chat facilities. The following constructivism theory which states that students construct knowledge and discover themselves, transform complex information, check new information with old rules, and revise again when these guidelines apply to construct knowledge where rules are no longer applied. Central points of method are that students can construct their data through learning using Edmodo learning.

The following theory of John Dewey's teaching (Stone & Logan, 2018) reflective methods in solving problems that are an active and careful thought process, which is based on thought processes towards definitive conclusions. In e-learning lectures, students explore knowledge by thinking critically individually and in groups using group facilities. E-learning as a student-centered learning method that has adequate skills and abilities to prepare them to think critically. Learning outcomes using learning in the form of increased critical thinking skills as measured through components of interpretation, analysis, evaluation, inference, and explanation following the opinion of Ramsay, J., and Sorrell, E. (Benckendorff et al., 2012) that e-learning embodies centered learning as the main goal of education. Furthermore, e-learning aims to develop students in effective way to solve problems and to improve critical thinking. In the Edmodo LMS feature, Students' critical thinking skills development found with same facilities.

Validation results and validation of products developed in the form of e-learning media and critical thinking instruments were carried out by three experts who are competent in their fields. E-learning media and instruments of critical thinking skills can be implemented in the learning. Results of the Implementation Stage and e-learning media implemented in the Learning Planning course to the faculty members of the university with limited and wide-scale trials. Limited Trial Results Limited trials were carried out aimed at knowing practicality and legibility (Gumanti, etal., 2016) of product development results. This test is conducted by lecturers and students because both users are of e-learning that was developed. Based on the data obtained from the final result test (post-test), critical thinking skills of students indicated that before and after being taught by e-learning has a significant difference.

Discussion

E-learning media has a very significant effect on improving the level of students' critical thinking skills. Students' critical thinking skills before an application of (pre-test) e-learning media and after the

implementation (post-test) of e-learning media have better the critical thinking skills than before the implementation of e-learning media. The research of Ary Argubhy (Abidin et al., 2020) e-learning media declared an appropriate as a learning media. (Tavangarian et al., 2004) explained that the blended learning model in the e-learning feature improved students' critical thinking skills. The findings of evaluation phase after going through the previous stages, the development of the e-learning media received several improvements that needed to be done. The e-learning evaluation is carried out based on assessment sheets, input and suggestions from expert validators and test subjects as users. The evaluation phase is carried out with two parts, namely formative and summative evaluation. The formative evaluation is carried out at every stage of ADDIE development. While summative evaluation consists of the final evaluation of the entire ADDIE process.

Conclusion

The current study, findings of the research on development of Edmodo based e-learning media through lesson planning course concluded the following: The e-learning media is developed as a product to train students. The form of a group developed in the course of Learning Planning based on Edmodo. The quality of Edmodo-based e-learning media and the Learning Planning course based on the results of expert trials and product trials for students: (1)The results of trials by media design experts are very good qualifications (87.5%), (2) the results of testing by material experts are highlighted (94) very good qualifications, (3) results of small group trials pointed out 8.12% which ranked very good qualifications , (4) large group trials results' are very good qualifications (82,26). The e-learning media is improving critical thinking skills of students effectively that are highlighted the differences in the results of students' critical thinking tests from 56.7 to 81.3. The findings concluded a dynamic approach that the e-learning media is practical, valid and an effective criterion to improve the level of students' in critical thinking skills. Therefore, use of e-learning media in learning can be integrated using Edmodo, and further development can be applied to different materials. In lectures, use of Edmodo e-learning and students' competition become an idea to solve a problem and can defend his opinion to other students. Students are accustomed to mastering critical thinking skills in terms of interpretation, analysis, evaluation, selection, and explanation. Students are encouraged to learn master critical thinking skills as the knowledge can be used in everyday life.

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