

Application of Physics Learning Media Based on E-Learning on Critical Thinking Abilities

Medina Sophia Pratiwi^{1*}, Jumadi¹, Mega Safana¹

¹Department of Physics Education, Faculty of Mathematics and Natural Sciences, Universitas Negeri Yogyakarta, Yogyakarta, Indonesia.

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Corresponding Author:

Medina Sophia Pratiwi

medinasophia.2022@student.uny.ac.id

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Abstract: This study aims to see the effectiveness of e-learning based learning media on critical thinking skills. The method used is a literature review with a qualitative approach. This study describes the development of technology as a challenge for the world of education to continue to innovate in the learning process so that it can remain balanced with the demands of the 4.0 Learning media is an effort to optimize the abstract learning process into reality. The use of learning media is now increasingly modern based on e-learning which utilizes the internet so that it can be used and accessed easily. The use of e-learning based learning media can improve critical thinking skills in the industrial revolution 4.0. Judging from the studies that have been presented, the use of media greatly helps educators in the teaching and learning process, especially in abstract lessons that can be visualized through learning media.

Keywords: Critical thinking; E-learning; Learning media; Literature; Technological development

Introduction

This era of globalization is a challenge for the field of education. The development of information technology that is quite significant forces the world of education to continue to innovate and go hand in hand with the development of technology for the advancement of education (Lathifah, 2020; Serdyukov, 2017). One of the functions of educational technology is to change conventional learning methods into non-conventional ones (Christopoulos & Sprangers, 2021; Sakti, 2019). The existence of this technology has changed the face of education along with the development of the era. The impact is increasingly felt along with the shift in offline learning patterns towards more online education by utilizing information and communication technology as a learning medium (e-learning) (Hurajova et al., 2022; Nurfalah, 2019; Thongmak & Ruangwanit, 2021). In addition, technological developments have become supporting media in the era of 21st century learning demands in

innovating learning. 21st century education or known as the era of the industrial revolution 4.0 is based on digital technology and 21st century learning skills. 21st century skills or 4C include creative thinking skills, critical thinking and problem solving, communication, and collaboration (Aulia, 2022; Partono et al., 2021; Putri et al., 2022). The achievement of 21st century skills is supported by the ability of educators to develop learning plans that include 4C activities (Ağaoğlu & Demir, 2020; Herlinawati et al., 2024; Munandar et al., 2018). Thinking skills such as critical thinking, creative thinking and problem solving are considered necessary skills for 21st century individuals (Masnur, 2021; Thornhill-Miller et al., 2023). Critical thinking is a demand of the 21st century that is often demanded and scrutinized. Critical thinking means thinking correctly so skills are needed by training or getting used to it. Therefore, it is necessary to be trained in certain ways. These skills will make it easier to face the ever-growing era of globalization.

The demands of 21st century learning is also a big challenge for teachers, in addition to being able to

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balance technological developments, they are also required to be able to innovate in learning by collaborating technological innovations. In addition, teachers are also required to create a creative and innovative learning atmosphere, for this reason learning media is needed as supporting teaching materials (Partono et al., 2021; Rahim et al., 2022). Learning media is a tool that has the function of conveying messages (Astuti et al., 2017; Faishol & Mashuri, 2022; Puspitarini & Hanif, 2019). Many types of e-learning-based learning media that can be developed by teachers as a complement to learning such as video, audio, image, power point to game-based media such as k-hoot media can be utilized through digital e-learning. On the other hand, there is virtual PhET media that helps the learning process, especially for physics practicums, namely virtual laboratories. So, there are many technological innovations that can be utilized by educators to help the learning process.

In the last few decades, the use of educational technology or e-learning has become a trend among researchers. The existence of information technology on the one hand greatly helps educators in visualizing learning. E-learning is one of the electronic media that uses the use of the internet to obtain very broad and actual sources of information (Pratiwi et al., 2020; Ende et al., 2023). Moreover, physics material is material related to everyday life, so educators are required to be able to explain the concept in real form.

The existence of e-learning greatly facilitates learning for both educators and students. Educators can explain through internet-based media that is very easy to access. No need to download software. The use of e-learning is identical to digital media that is closely related to the internet. E-learning can be used from elementary school to college. In physics itself, the use of e-learning is widely used in explaining abstract things to be real through virtual. Many physics materials are abstract so that e-learning learning media is a solution to help the learning process. Based on the description above, more modern learning is needed in accordance with technological developments by using e-learning-based learning media for critical thinking skills.

Method

This study uses a literature review research design with a qualitative approach. The research data is in the form of secondary data obtained through data collection techniques using literature studies, namely in the form of analysis of data sources from national journals and international journals published in the last 7 years (Olabode et al., 2018). Meanwhile, the stages for conducting a literature review according to Machi & Evoy (2009) are 6 stages, namely.

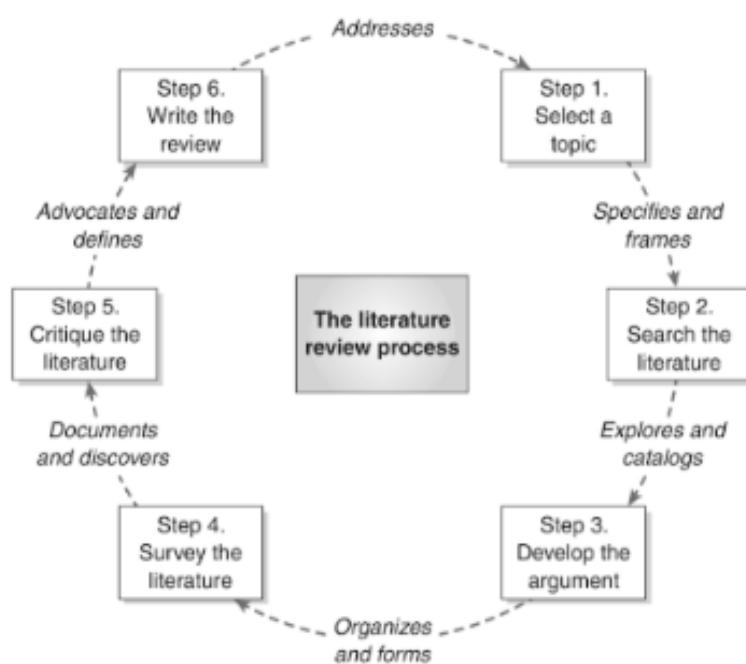


Figure 1. Stages of conducting a literature review according to Machi & Evoy (2009)

The steps in conducting a literature review in this study are: choosing a topic; searching for related literature; developing arguments; conducting a survey of the literature; critically evaluating each literature; and writing a literature review. Through this method, the author tries to understand and interpret the meaning of an event of human behavioral interaction in a certain situation according to the researcher's own perspective. Research using qualitative research aims to understand the object being studied in depth. Data collection techniques are carried out by reviewing several journals and scientific literature or what is known as a literature study.

Result and Discussion

This section will discuss e-learning based learning media, critical thinking and e-learning media on critical thinking skills.

E-Learning Based Learning Media

The word "media" comes from Latin and is the plural form of "medium", literally meaning intermediary or messenger (Lathifah, 2020; Rahmayanti et al., 2020). According to Sakti (2019), Learning media are all tools and materials that can be used to achieve educational goals such as radio, television, books, newspapers,

magazines and so on. As for learning as a process of interaction in the learning process consisting of all existing components. The learning components include teachers, students, materials, media, learning resources and the environment (Huda et al., 2021; Lau et al., 2018). In addition, the use of learning media will attract more students' attention, the learning materials will be easier for students to learn, the teaching methods will be more varied, and students will be more active in the learning process and even the use of media will be able to improve the quality of the teaching process and results. The more the era changes, the more modern the technology. Currently, researchers are competing in researching learning media using e-learning.

E-Learning is a learning process through electronic media, especially the internet. Currently, e-learning is a learning medium used in addition to face-to-face in class. This is because e-learning allows students to be able to learn or gain knowledge whenever and wherever they are. E-learning is also an alternative for students who experience boredom learning in face-to-face in class (Herayanti et al., 2018; Octaberlina & Muslimin, 2020; Rawashdeh et al., 2021). The e-learning view as developed by Safana et al. (2021) which describes visual and audio visual media in the form of global warming learning videos as in Figure 2.



Figure 2. Global warming e-learning learning media

Through e-learning, students are encouraged to manage the entire learning process themselves in terms of organizing their own environment, motivating themselves, increasing their knowledge independently, proactively and with full consideration (El-Sabagh, 2021; Masnur, 2021). Therefore, the use of e-learning in education, especially in teaching and learning, is very beneficial.

Critical Thinking

Critical thinking means being able to think correctly. Critical thinking is a process and ability involved in making rational decisions about what to do

and what to believe. With good critical thinking skills, you can provide good recommendations for taking action. The essence of critical thinking is an attitude that someone uses to assess something (Sri & Muis, 2022; Widiastuti et al., 2023). Critical thinking skills are considered important because critical thinking skills can support students in decision making, assessment and problem solving (Hart et al., 2021; Pratiwi et al., 2020; Rini & Aldila, 2023; Rivas et al., 2022). Meanwhile critical thinking according to Ngurahrai et al. (2019) students can be said to be able to think critically when they can speak using the right reasons, both logically and

systematically to solve a problem. Critical thinking indicators used include identifying problems, collecting various relevant information, compiling a number of alternative solutions to problems, making conclusions, expressing opinions, and evaluating arguments (Ichsan, 2020; Prafitasari et al., 2021; Supena et al., 2021). Therefore, critical thinking skills are one of the 21st century learning that is very much needed.

E-Learning Media on Critical Thinking Skills

Based on the results of the literature study, it can be summarized that the use of e-learning based learning media is very helpful for educators in explaining the abstract into reality and providing convenience for users to get a lot of material from the internet. The use of e-learning is very easy and does not require software installation, for example, virtual laboratory media phet can be accessed via the internet. In addition, the use of the khoot game application can be accessed via the internet.

In the last few decades, the use of e-learning has become a trend among researchers. Many researchers have conducted research related to e-learning-based education research. Such as research by Astuti et al. (2017) and Abdulsaeed et al. (2022) about the use of android-based mobile learning physics learning media is very good to use as a learning aid. In line with research from Herayanti et al. (2018) that the use of problem-based moodle media can improve students' critical thinking skills on global warming material. In general, students gave good responses to the design, ease of use and role of media in moodle learning. This media can also make students more enthusiastic and active in learning, also give an interesting, positive impression and help explain something deep and abstract.

Further research by Nurfalah (2019) entitled optimization of virtual class-based E-Learning with Google Classroom as a physics learning medium. Based on the results of the study, it can be concluded that the Google Classroom feature has an important impact on learning in the era of the industrial revolution 4.0, including: learning is carried out online by utilizing information technology; not limited by space and time; involving students in the learning process that utilizes internet access; learning materials are easily accessible; and training data literacy skills and technological literacy. The creation of Google Classroom can be done easily by educators to make learning effective and efficient.

The same research on virtual media by Ngurahrai et al. (2019) entitled learning media for momentum and impulse material based on mobile learning to improve students' critical thinking skills. The results shown in this study are that there is an increase in students' critical

thinking skills after using mobile learning-based learning media. This increase is included in the moderate increase category. So that mobile learning-based learning media can be used as an alternative media in learning to help improve students' critical thinking skills.

Then the next research entitled efforts to train critical thinking skills of high school students during the Covid-19 pandemic through volcanic simulation software learning media was studied by Mahfudin & Hariyono (2020) revealed that the Mount Merapi simulation software can be used as a learning medium to improve students' critical thinking. The same research from Pratiwi et al. (2020) with the research title Learning Media for Momentum and Impulse Material Based on Mobile Learning to Improve Students' Critical Thinking Skills states that mobile learning media can be used to improve critical thinking skills.

The latest research from Masnur (2021) with the title of the research on the effectiveness of e-learning edmodo and google classroom on critical thinking skills shows that there is a difference in the N-Gain value of the Experimental class which has a higher value compared to the control class, where the N-Gain value of the experimental class is 0.61 while the N-Gain value of the control class is 0.52. This is because the experimental class uses the edomodo platform which has file and link features, Assignment features and Quiz features that can train critical thinking skills.

From the research above, with a span of 5 years, learning media still exists and is used to help the continuity of learning. The existence of media greatly helps educators in improving critical thinking skills in physics which requires following technological developments in the era of the 4.0 revolution. Learning media is increasingly modern along with technological developments. The development of technology also develops learning methods. It can be seen that learning using e-learning is one of the uses of learning media that is widely studied.

Conclusion

The use of e-learning based learning media can improve critical thinking skills in the industrial revolution 4.0. Judging from the studies that have been presented, the use of media greatly helps educators in the teaching and learning process, especially in abstract lessons that can be visualized through learning media. The development of technology has also made learning media increasingly modern into e-learning because it can be easily accessed using the internet and is very effective and practical to use. Suggestions for further research are to be able to choose the right media or use

it through development to be more consistent with the learning that is carried out.

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