APPLICATION OF THE E-LEARNING MODEL IN EARTHQUAKE LEARNING TO IMPROVE STUDENTS' UNDERSTANDING OF EARTHQUAKE DISASTER PREPAREDNESS

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ABSTRACT

This study aims to describe the application of e-learning in improving students' understanding of earthquake disaster preparedness. This study used a quasi-experimental design with an equivalent time series type. The research sample was taken of grade 10 Senior High School 5 Banda Aceh with a non-probability sampling method. The stage of this research is that students are given a pre-test to see their initial level of understanding before being given a treatment, then students are given a treatment in the form of earthquake preparedness learning through the e learning model. the understanding of students after participating in learning with the e learning model has increased by 14.44 %. As for the n-gain value is 0.54 (moderate criteria), the N-gain value indicates that learning with the e-learning model is effective in improving students' understanding of earthquake disaster preparedness. based on research data analysis it was seen that students' understanding of earthquake disaster preparedness had increased compared to before. Meanwhile, related to the effectiveness of learning, based on data analysis, it was found that learning earthquake disaster preparedness using the e-learning model was effective in increasing students' understanding of earthquake disaster preparedness.

Keywords: E-learning; Disaster; Earthquake; Preparedness

A. INTRODUCTION

Indonesia is a country that is located on three junction lines of active tectonic plates, this is why Indonesia is a country that frequently occurs in earthquakes. The three plates are the Eurasian plate, the Indo-Australian plate and the Pacific plate. The movement of the three plates causes the islands in Indonesia to experience frequent vibrations, especially in the area where the plates meet, namely the confluence of the Eurasian plate and the Indo-Australian plate along the islands of Sumatra, Java, and the Nusa Tenggara Islands; and the confluence of the Indo-Australian and Pacific plates around the island of Papua.

Earthquakes are vibrations on the earth's surface as a accompanying symptom of tectonic and volcanic activity and sometimes the collapse of parts of the earth locally. what you feel when an earthquake occurs is the vibration in the earth where we are at that time. The earth shakes sideways and upward (Katsumata

et al., 2021). In Indonesia, especially the Aceh province, there was a large earthquake with a magnitude of 9.3, which was centered at ± 160 KM from the West Coast of Aceh Province. This disaster has generated a massive wave, namely the tsunami wave. The tsunami waves not only swept the Aceh Province but also the coasts of the countries around the Indian Ocean. The lack of knowledge about disasters that is owned by the community makes the community unprepared for the disaster, thus causing many people to die.

In addition to the large number of people who died, the impact of the disaster was also very pronounced in the education sector where students experienced difficulties in carrying out learning activities due to damaged educational facilities. Disasters also often have lasting consequences for children. The destruction of educational infrastructure due to the disaster caused children to lose the opportunity to participate in educational activities. Educational activities are then held in temporary schools. In many catastrophic events, this condition lasts a long time. This situation is clearly less favorable for children who have to study with limited facilities, which in the end the teaching and learning process cannot take place optimally (Rababa, 2021).

Disaster preparedness is one part of the disaster management process in the currently developing concept of disaster management, increasing preparedness is one of the important elements of pro-active disaster risk reduction activities, prior to a disaster. The disaster management process is presented as a cyclical model, incorporating increased preparedness as part of the disaster risk management process (Alem et al., 2021).

Through good disaster preparedness, it is hoped that the community can act quickly in self-rescue and can help others when a disaster occurs. On the other hand, a lack of understanding of disaster preparedness will result in panic, trauma and unpreparedness in facing a disaster. Preparation and preparation for disaster situations are not the only responsibility of health workers. Conversely, in a disaster situation requires a lot of trained human resources. Consequently, participation and coordination with the community is also needed (Lestari et al., 2021).

The provision of disaster education is an effective strategy in shaping disaster-responsive communities. (Yari et al., 2021) states that comprehensive education that involves schools and communities in the formation of knowledge, character, creativity and

innovation is very relevant in the initial awareness-building approach to disaster preparedness.

School is a place for implementing the teaching and learning process or a place for effective knowledge transformation for students, so that students are expected to be able to apply knowledge related to disaster preparedness. (Vasodavan et al., 2020) states that schools have a role as the implementation of education and cannot be separated from the teaching and learning process which is the essence of developing interests, talents and creativity. The learning process that occurs in the school environment is expected to be able to develop students' knowledge about disasters so that they can be prepared to face the risks of disasters that will occur and be able to minimize the impact of disaster risks.

Innovative and creative learning models are expected to be able to manage and develop learning components in a planned design by paying attention to the actual conditions of the supporting elements in the implementation of the learning to be carried out. Innovative learning is learning that is more student centered, which means that learning provides more opportunities for students to construct knowledge in self-directed and peer-mediated instruction.

Innovative and creative means that students are directed to reasoning, be critical, put forward ideas, give birth to any simple work, and are trained to solve problems. In addition, to increase student creativity and interest in learning, means that help develop students' cognitive abilities, namely learning media are needed (Caeiro & Azeiteiro, 2020).

When science and technology develop rapidly, the learning process is no longer monopolized by the presence of teachers in the classroom. Students can study anywhere and anytime. (Bock et al., 2021) states that the development of information technology can improve performance and enable activities to be carried out quickly, precisely and accurately, resulting in high productivity. Thus e-learning as an electronic medium can have a changing impact on the learning process. Furthermore, the purpose of using e-learning in the learning system is to expand access to education to the wider community.

From this explanation, it can be concluded that the interaction between students and teachers does not always have to be face to face, students can start learning on their own using electronic media with developing technology as an intermediary so that the teaching and learning atmosphere becomes more interesting and interactive.

E-Learning is a network, which makes it possible to update, store / retrieve, distribute and share instructions or information sent to users directly via a computer using internet technology (Milićević et al., 2021). Furthermore, (Foo et al., 2021) defines e-learning as the use of information technology and computers to create learning experiences. Based on this theory, it can be defined that e-learning is an electronic-based learning media using technology in the form of computers. Regarding disaster preparedness learning, it is hoped that the e-learning learning model can improve students' preparedness in facing earthquake disasters.

There are many ways to create a learning innovation to make the learning atmosphere fun, interesting but still fulfills the ideal learning criteria. From the results of research conducted by (Wisanti et al., 2021) regarding the teaching and learning process through the e-learning learning model in general, it can improve the abilities of students with the results showing that the implementation of the e-learning learning model can make the learning atmosphere more interesting and the interaction between teacher and students. to be

effective, so that students are increasingly interested in participating in learning.

Furthermore, the results of research conducted by (Asvial et al., 2021) found that student preparedness could be improved by increasing students' knowledge and understanding of disasters through geography learning tools on the subject of earthquakes. Furthermore (Herdiansyah et al., 2020)(Munif et al., 2021) in his research concluded that student preparedness in the face of earthquakes can be improved through information technology-based learning models using, pictures, earthquake preparedness materials by exploring local wisdom such as the *ular tangga* game, evacuation maps and "engklek" games.

Based on observations and theoretical studies, it is deemed necessary to carry out searches, further scientific studies through research related to the application of the E-learning model in learning.

Regarding technical research, in this study students were given treatments in the form of earthquake preparedness learning through the e learning model, while the steps for using the e learning model can be seen in the following figure:
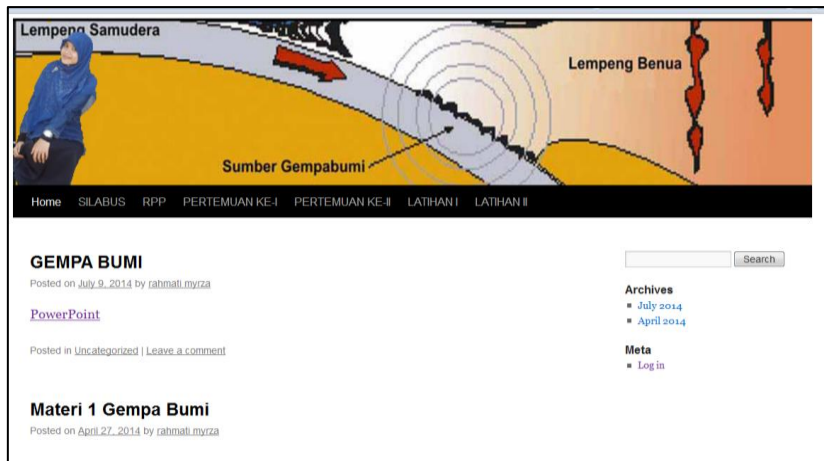
Figure 1. The Opening Display of E-Learning Learning
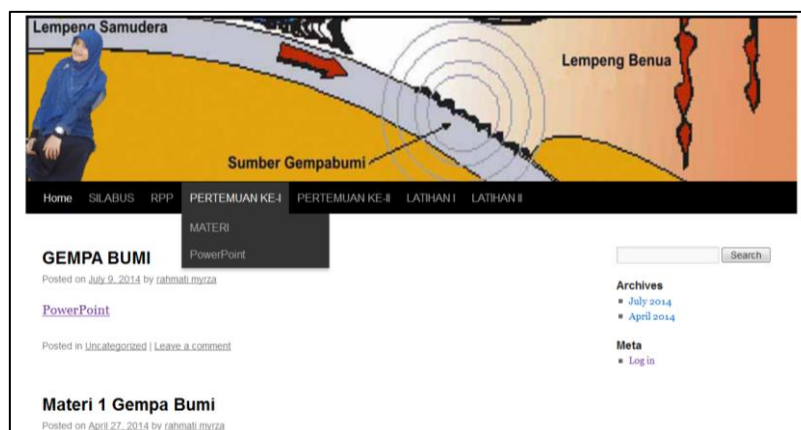

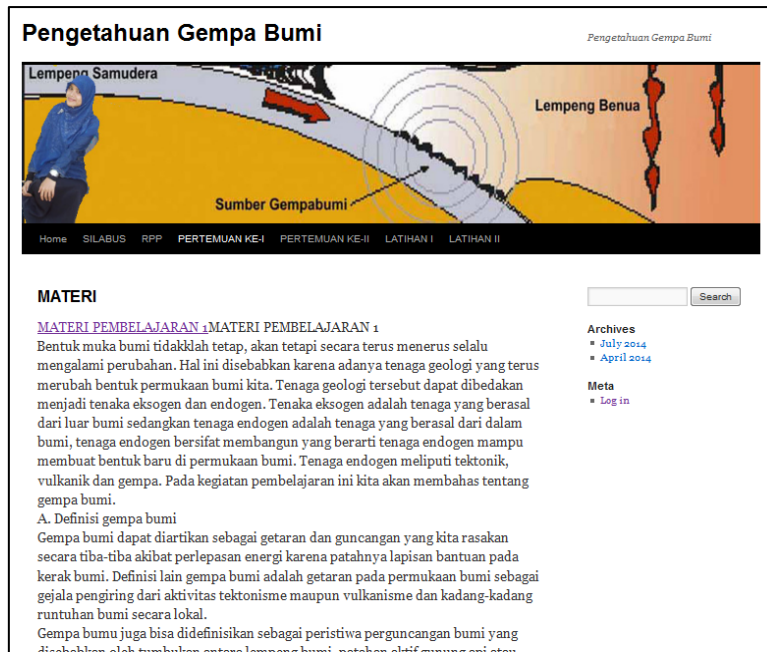**Figure 2.** Category Selection Display

Figure 3. Display Content Options
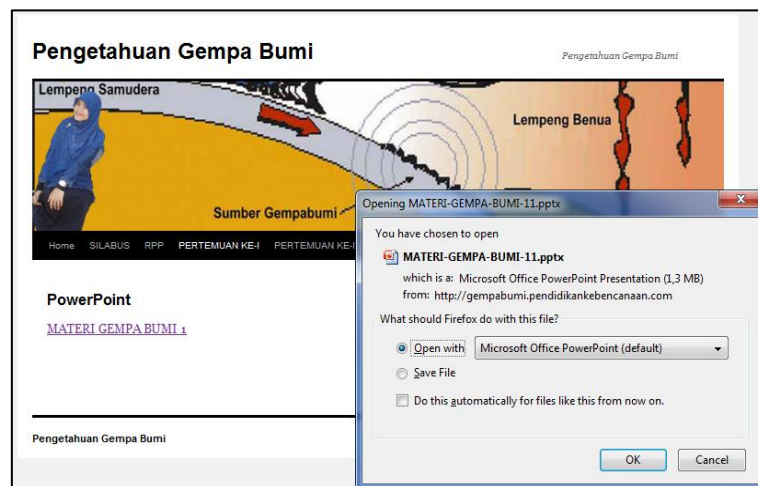
Figure 4. Display the Content that has Been Selected
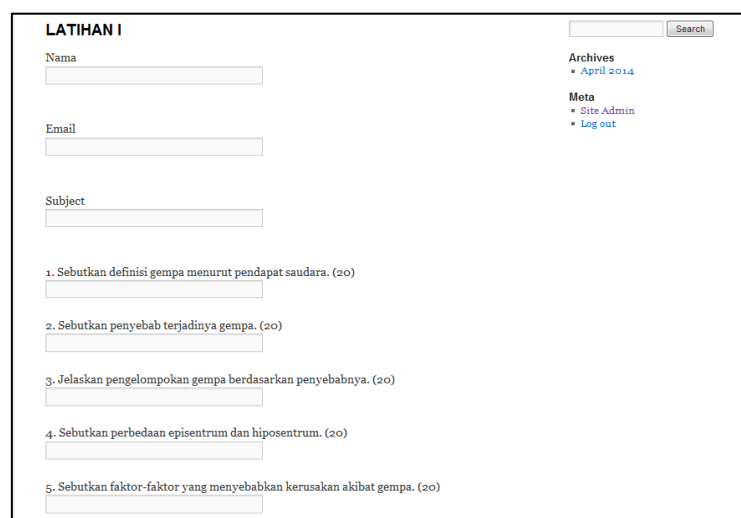

Figure 5. Display Content for Download

Figure 6. Exam View

Figure 7. Display for Sending Exam Results

B. MATERIALS AND METHODS

This study uses a quantitative approach. This type of research is experimental research with a pre-experimental design approach. In this design, the subjects will be given a pre-test before treatment (Nismalasari et al., 2016). Participants in this study were students of class 10 senior High School 5 Banda Aceh. A sample selected by means of non-probability sampling.

Analysis test to determine the increase in students' understanding of earthquake disaster preparedness using the results of pre-test, post-test, gain and N-gain. Gain is the difference between the pre-test and post-test scores. To show the quality of the increase in students' understanding after being given treatment, the normalized average gain formula is used (Majdi & Subali, 2018). N-gain (normalized gain) is used to measure students' understanding of earthquake disaster preparedness between before and after learning e-learning methods. The gain interpretation table can be seen in table 1:

Table 1. N-gain interpretation

$<g>$	Criteria
$<g> <0,30$	Low
$0,30 \leq <g> <0,70$	Medium
$0,70 \leq <g> \leq 1,00$	High

C. RESULTS AND DISCUSSION

Data analysis of student disaster preparedness variables is divided into three parts, namely: before the earthquake, when the earthquake occurred and after the earthquake, the description of the research results can be seen in the table of test results for students' understanding of earthquake disaster preparedness.

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Table 2. Test results for students' understanding of earthquake disaster preparedness

Disaster stages	No	List of Statements	Answered correctly	
			Before E-Learning (%)	After E-Learning (%)
Before the earthquake	1	I need to understand the area I live in and the places that are safe as evacuation routes for self-rescue measures in the event of an earthquake	100	100
	2	I don't need to understand about disasters.	63,3	96,7
	3	I am willing to take part in an earthquake disaster evacuation exercise or simulation at school to save myself during a disaster.	100	100
	4	I prepared a standby bag containing snacks, blankets, first aid kit, radio, flashlight, clothes and important documents.	86,7	83,3
When the earthquake	5	I don't need to unplug all the equipment connected to electricity and gas.	56,7	73,3
	6	staying away from buildings is the right thing to do when an earthquake occurs.	40	60
	7	it is wrong to go into large open areas during an earthquake.	63,3	90
	8	while driving immediately stop	53,3	76,7
After the earthquake	9	I will check with family members and relatives.	73,3	100
	10	preparing a public cooking area for refugees is not my responsibilityk.	56,7	73,3
	11	help prepare emergency tents to shelter all refugees including my responsibility.	100	100
	12	I immediately went to the aid post and health post.	86,7	100
		Average	73,33	87,78
		N-gain	0,5	

The pre-test results showed that the students' understanding of earthquake disaster preparedness was 73,33 %. As for the results of the post test, it shows that students' understanding of earthquake disaster preparedness has increased by a percentage of 87,78 %. This shows that the understanding of students after participating in learning with the e learning model has increased by 14.44 %. Based on these data, the n-gain value is 0.54, and based on table 1, this value is in the "medium" category,

which means that learning with the e-learning model is effective in increasing students' understanding of earthquake disaster preparedness.

The results of data analysis showed that there were positive changes in students after implementing e learning in earthquake learning. e-learning is a learning model that can increase attractiveness and is very suitable to be applied in the 21st century era (Munif et al., 2021). e-learning can accommodate broad technological developments

without having to carry out face-to-face learning. e-learning enables students to continue learning and follow the learning process even though they have to study at home because of the current pandemic condition. e learning also helps teachers create a learning environment that suits their learning styles and helps students face future challenges. One of the goals of implementing the e learning model is to help students develop better in the learning process, according to learning styles and preferences (Munzil et al., 2021).

D. CONCLUSIONS

After students received treatment through earthquake disaster preparedness learning using the e-learning model, it was seen that students' understanding of earthquake preparedness had increased compared to before. Meanwhile, related to the effectiveness of learning, based on data analysis it is known that learning earthquake disaster preparedness using the e-learning method is effective in increasing students' understanding of disaster preparedness.

The novelty of this research is that the author has developed an e-learning-based earthquake disaster preparedness application system, which is expected to be used by teachers in schools as an alternative method of distance learning,

especially during the current pandemic. In addition, the author has developed a test instrument to measure the level of students' resistance to earthquake disaster preparedness.

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