



# Community-Based Web-Learning Media for Disaster Mitigation Understanding of University Students

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## ABSTRAK

Indonesia merupakan negara yang sering terjadinya bencana sehingga diperlukan pemahaman mitigasi bencana yang baik. Pada penelitian sebelumnya peneliti telah mengembangkan sebuah inovasi pembelajaran untuk meningkatkan pemahaman mitigasi bencana mahasiswa. Inovasi tersebut berupa web-learning berbasis komunitas. Web learning ini sudah dinyatakan layak untuk digunakan. Perlu kajian lanjutan untuk mengetahui dampaknya terhadap pemahaman mitigasi bencana mahasiswa. Tujuan penelitian ini adalah untuk mengetahui pengaruh web-learning berbasis komunitas terhadap pemahaman mitigasi bencana mahasiswa perguruan tinggi. Penelitian ini menggunakan desain quasi eksperimen dengan menggunakan nonequivalent control group design. Sampel penelitian terdiri dari 200 mahasiswa perguruan tinggi. Pemahaman mitigasi bencana mahasiswa diukur menggunakan tes essay. Proses analisis data menggunakan aplikasi SPSS 26, meliputi uji deskriptif, uji normalitas, uji homogenitas, uji paired sample t-test, dan uji independent t-test. Hasil penelitian ditemukan bahwa terdapat perbedaan signifikan dalam rata-rata pemahaman mitigasi bencana mahasiswa perguruan tinggi yang belajar menggunakan media web-learning berbasis komunitas dan siswa yang belajar menggunakan model pembelajaran konvensional. Mahasiswa yang belajar menggunakan web-based learning memiliki rata-rata lebih tinggi dibandingkan dengan mahasiswa yang belajar di kelas konvensional. Hal ini membuktikan penggunaan web-learning berbasis komunitas mampu meningkatkan pemahaman mitigasi bencana mahasiswa perguruan tinggi.

## ABSTRAK

Indonesia, disasters frequently occur, so a good understanding of disaster mitigation is needed. Researchers have developed a learning innovation in previous research to increase students' understanding of disaster mitigation. This innovation is in the form of community-based web-learning. This web learning has been declared suitable for use. Further studies are needed to determine the impact on students' understanding of disaster mitigation. This research aims to analyze the effect of community-based web-learning on higher education students' understanding of disaster mitigation. This research uses a quasi-experimental design using a non-equivalent control-group design. The research sample consisted of 200 university students. Students' understanding of disaster mitigation is measured using an essay test. The data analysis process uses the SPSS 26 application, including descriptive tests, normality tests, homogeneity tests, paired sample t-tests, and independent t-tests. The research results found a significant difference in the average understanding of disaster mitigation for university students who studied using community-based web-learning media and those who studied using conventional learning models. Students who use web-based learning have a higher average than those who study in conventional classes. This result proves that community-based web learning can increase higher education students' understanding of disaster mitigation.

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## 1. INTRODUCTION

Indonesia is a nation that faces the threat of natural disasters. This is so because Indonesia is positioned between two active tectonic plates in the Pacific Ring of Fire (Dharma, 2019; Rambe, 2018). Because of this, Indonesia is frequently affected by large earthquakes and volcanic eruptions. Furthermore, Indonesia frequently experiences other types of extreme weather, including tropical storms, landslides, floods, and tsunamis. For the people of Indonesia, understanding of mitigation is crucial in the face of disaster threats. We may lessen the dangers and effects brought on by disasters by comprehending and putting mitigation measures in place. Communities must be made aware of the risks posed by catastrophes and instructed on what to do in the event of one. It is not simply the responsibility of the government and the public to understand mitigation. To acquire an understanding of disaster mitigation, students in higher education also play a crucial role (Abbas, 2021; Sakurai et al., 2020). Students have the chance to be change agents and participants in initiatives to lessen the effects of disasters because they are a youthful, intelligent, and potential-filled generation. Higher education students have access to information, tools, and other resources that can be used to comprehend and successfully apply disaster mitigation measures (Apriyanti, 2019; Wardana et al., 2021). Through individual study and conventional classroom instruction, students can learn about disaster science, modeling, risk analysis, and best practices in disaster mitigation. So that the learned information can be used to improve the environment (Apriyanti, 2019; Verlenden et al., 2021).

However, based on researchers' observations of research university students during the earthquake in Aceh. Many students lost their way when the earthquake occurred. Students ran out of the building randomly. Many of them fell when running out of the building. After the earthquake, many students immediately returned to the building to pick up the items they had left behind without paying attention to the condition of the building. These observations indicate that students' knowledge in tertiary institutions still needs to improve regarding disaster mitigation. The results of these observations were strengthened by the initial measurements of understanding of disaster mitigation that researchers carried out on 200 university students. Based on measurements, the average result of students' understanding of disaster mitigation in tertiary institutions was 56.31. These findings prove that university students' understanding of disaster mitigation still needs to improve.

These findings are reinforced by the results that students in higher education still have a limited grasp of disaster mitigation (Harlan, 2020; Reuge et al., 2021). This conclusion is supported by the findings of the initial mitigation understanding test, which involved 200 college students. It was discovered that on average, students scored 56.01 on the test, which measured their level of comprehension. This result suggests that students in higher education still have a limited understanding of catastrophe mitigation. The researchers' analysis, several variables, including limited access to and an outdated learning process, can contribute to students' poor grasp of disaster mitigation. Modern learning approaches that are restricted to textbooks and classroom lectures are frequently insufficient to meet the demands of effective learning. Students may find learning about disaster mitigation to be less engaging and entertaining if they solely use textbooks. This may result in a general lack of comprehension of concepts and procedures related to catastrophe mitigation. Additionally, traditional educational approaches that are restricted to the classroom are unable to offer the more concrete practical experience required to understand catastrophe prevention. Digital learning materials are therefore required to solve these issues.

Web-based learning is one of the available digital learning resources. Web-based learning materials can give students access to knowledge that is more engaging, interactive, and visually appealing (Lin. & Wang, 2017; Purmadi & Surjono, 2016). For instance, by using computer simulations or animated movies that depict catastrophic situations and the necessary mitigation steps. The flexibility of time and location is another benefit of web-based learning media (Dwi Saputra et al., 2022; Nieto-Escamez & Roldán-Tapia, 2021). Through their PCs, laptops, or mobile devices, students can access educational resources online at any time and from any location. As a result, learning is more widely accessible, and students are free to repeat lessons and learn at their own pace. To actively engage students, web-based learning materials might also include interactive components like tests, tasks, or discussion boards (Abdurrahmansyah et al., 2022; Purmadi & Surjono, 2016). By enabling them to share their expertise and experience in disaster mitigation, this promotes student collaboration. To produce a more immersive and realistic learning experience, web-based learning media can also make use of technologies like virtual reality (VR) or augmented reality (AR) (Jang et al., 2021; Martín-Gutiérrez et al., 2017). For instance, students can view 3D visualizations of earthquake-resistant building systems or "experience" disaster simulation in a virtual setting. As a result, in earlier research, researchers created web-learning materials to improve students' comprehension of mitigation in higher education.

A learning strategy known as community-based web learning creates a vibrant, interactive learning community through using online platforms. Community-based web learning is used in the context of disaster mitigation to inform and involve the general population in mitigation activities (Abbas et al., 2019;

Mphasha, 2022). People can join discussion forums, study groups, or online networks that deep-dive into themes related to disaster mitigation through the online platform. Students can communicate with neighbors, exchanging information, stories, and tools for preventing disasters. Members of the community can also access extensive learning resources online, such as learning modules, video lessons, and articles (Atmojo, 2021; Ramadhan et al., 2019). Community-based web learning has the benefit of being flexible and accessible, allowing students to learn whenever and wherever they want using their computers or mobile devices. Additionally, this strategy promotes community members' cooperation and knowledge sharing, enabling them to exchange experiences, solutions, and creative ideas for disaster mitigation. Communities can access and update their knowledge over time and participate in lifetime learning for disaster response by using community-based web learning. This community-web-based learning resource has been developed and approved for usage by experts (Atmojo, 2021; Suarmika et al., 2022).

From this statement, web-based learning can potentially increase students' understanding of disaster mitigation. This fact is because flexible and technology-based learning allows students to study anywhere and at any time, both independently and in groups. Apart from that, access to technology also attracts students to be more interactive in the learning process. Web-based learning can also provide concrete learning through videos, animations, or the like so that students can understand the disaster mitigation process accurately and comprehensively. This fact is what makes web-based learning have the potential to increase students' understanding of disaster mitigation in higher education. The novelty of this study ascertains the impact on students' comprehension of disaster mitigation, as this research focuses only on verifying the viability of the approach. To fully apply the value of this community-based web-learning media, more study is required. Therefore, the goal of this study is to analyze how students' comprehension of disaster mitigation in higher education is affected by community-based web-learning media.

## 2. METHOD

In this study, a nonequivalent control group design was adopted in a quasi-experimental design 200 university students made up the research sample, of which 100 were assigned to the control group and 100 to the experimental group (Thyer, 2012). To help students comprehend disaster mitigation, the lecturer in the experimental class used community-based web-learning resources, whereas, in the control class, the lecturer used more traditional teaching methods. The data collection method uses tests. The data collection instrument used essay test questions. An essay test with 20 questions that were tailored to the indicators of disaster mitigation understanding was used to gauge students' understanding of disaster mitigation. The instrument grid is shown in Table 1.

**Table 1. Disaster Mitigation Understanding Test Grid**

Indicators	Item
Knowledge of disaster phenomena and disaster risks	1,2,3
Knowledge of disaster risk management	4,5,6
Level of knowledge of disaster mitigation (hydrological and geological) within the community	7,8,9
Ability to explain disaster risk management	10,11,12
Ability to explain disaster mitigation material	12,13,14,15
Ability to show pictures of the causes of disasters, how to save from disasters, and how to reduce disaster risks	16,17,18,19,20

Table 1 shows the grid of test questions that will be developed. Based on these indicators, the test questions were created, and they have undergone validity testing using the product moment correlation formula and content validity tests by experts. The results of the construct validity test reveal that each question has a calculated r-value larger than the r-table, confirming its validity, while the results of the content validity test demonstrate that the questions are valid and can be used. A reliability value of 0.935, indicating a very high level of reliability, was found after the questions' validity was further evaluated. The data analysis process uses the SPSS 26 application, including descriptive test, normality test, homogeneity test, paired sample t-test, and independent t-test to analyze data with appropriate statistics

## 3. RESULT AND DISCUSSION

### Results

Each lesson received the proper attention. Following the implementation of the action to each experimental class and control class, the following step is data analysis. To speed up data processing, data

are first tabulated as part of the data analysis process. These are the outcomes of the data tabulation that was done. Data tabulation of experimental class and control class is show in [Table 2](#).

**Table 2.** Data Tabulation of Experimental Class and Control Class

Group	N	Minimum	Maximum	Mean	Std. Deviation
Pre-Test of Experimental class	100	56	60	56.76	2.372
Post-Test of Experimental class	100	87	100	87.76	4.134
Pre-Test of Control class	100	55	59	55.87	2.362
Post-Test of Control class	100	56	60	56.78	1.246
Valid N (listwise)	100				

[Table 2](#) showed the baseline data of the four classes that have been measured. The following stage would include processing this data. A normality test was carried out to determine whether the data acquired had a normal distribution. The outcome of the obtained normality test is show in [Table 3](#).

**Table 3.** Normality Test

Dependent Variable	Group	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Understanding Disaster Mitigation	Pre-Test of Experimental class	0.263	100	0.015	0.932	100	0.016
	Post-Test of Experimental class	0.132	100	0.011	0.842	100	0.014
	Pre-Test of Control class	0.223	100	0.024	0.741	100	0.031
	Post-Test of Control class	0.248	100	0.075	0.792	100	0.023

[Table 3](#) showed that each class had a sig value greater than 0.05. This suggested that there was a normal distribution within each class. A paired sample t-test was then carried out as the next stage. The goal of this test was to figure out the average variation between two paired samples. This experiment aimed to determine whether community-based web-learning resources could be used. The paired sample t-test's findings are summarized in [Table 4](#).

**Table 4.** Results of Paired Sample Test

Paired Group	Paired Differences						t	df	Sig. (2-tailed)
	Mean	Std. Dev	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1 Pre-Test Experimental class - Post-Test Experimental class	-17.29	5.39	0.432	-18.29	-12.39	-65.92	99	0.000	
Pair 2 Pre-Test Control class - Post-Test Control class	-1.43	1.12	0.237	-1.21	-1.93	-7.34	99	0.021	

[Table 4](#) demonstrated that the sig value (2-tailed) for pair 1 was less than 0.05. This showed that students in higher education had an average comprehension of disaster mitigation between the pre-test and post-test in the experimental class. As opposed to pair 2, where the sig value (2-tailed) was higher than 0.05. This showed that there was no average difference in the control class's pre-and post-test scores in terms of the student's comprehension of disaster mitigation. The next step was to conduct a homogeneity test to see whether the post-tests for the experimental and control classes had the same degree of uniformity. The list includes the homogeneity test's findings is show in [Table 5](#).

**Tabel 5. Homogeneity Test**

Parameters		Levene Statistic	df1	df2	Sig.
Understanding Disaster Mitigation	Based on Mean	121.392	1	198	0.382
	Based on Median	96.329	1	198	0.432
	Based on Median and with adjusted df	95.323	1	198	0.381
	Based on trimmed mean	121.327	1	198	0.284

Table 5 showed that the "based on mean" sig value was 0.382, which was greater than 0.05. This showed that the variances in both sets of data were homogeneous. The next step was to run an independent sample t-test to determine whether university students who learnt using community-based web-learning media and those who learned using traditional learning methods had different understandings of mitigation. Table 6 contains the test results.

**Tabel 6. Independent Sample Test**

Parameters	Levene's Test for Equality of Variances		t-test for Equality of Means							
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
								Lower	Upper	
Understanding Disaster Mitigation	Equal variances assumed	112.31	0.00	66.29	198	0.000	35.32	0.44	33.63	88.50
	Equal variances not assumed			63.38	112.06	0.000	33.32	0.44	33.49	87.30

Table 6 showed that the sig value (two-tailed) was less than 0.05. This showed that there was a big difference between college students who learned using community-based web-learning media and students who learned using traditional learning models in terms of their average grasp of disaster mitigation. The information may be found in Table 7 to illustrate the value of comprehending disaster mitigation in greater depth.

**Tabel 7. Mean Data of Control Class and Experimental Class**

Dependent Variable	Group	N	Mean	Std. Deviation	Std. Error Mean
Understanding Disaster Mitigation	Post-Test of Experimental Class	100	87.76	4.134	0.432
	Post-Test of Control Class	100	56.78	1.246	0.283

The students in the experimental class had a higher average grasp of disaster mitigation than those in the control class, as shown in Table 7. This demonstrated that community-based web learning was successful in enhancing university students' awareness of catastrophe mitigation.

**Discussion**

The t-test calculations found a significant difference in the average understanding of disaster mitigation for university students who studied using community-based web-learning media and those who studied using conventional learning models. The results show that web-based learning students' average understanding of disaster mitigation (87.76) is higher than in conventional classes (56.78). This result

shows that community-based web learning effectively increases higher education students' understanding of disaster mitigation. According to the study's findings, students' awareness of disaster mitigation in higher education can be enhanced by using community-based web-learning media. This showed that students' comprehension of disaster mitigation was improved via digital learning. Other studies on digital learning in disaster learning confirmed the findings of this study (Nurcahyo, 2020). Other researched the creation of digital learning materials for elementary school kids that are based on comic books (Winatha et al., 2018). According to the study's findings, using the comic-based digital learning tool KOASE with primary school pupils to improve their comprehension of disaster mitigation is practicable from both the teacher and student perspectives (Basyoni et al., 2020).

Then, the findings of a study done by other study looked at the creation of digital comics for young children to improve their understanding of flood disaster mitigation (Samanta et al., 2018). The study's findings showed that experts had deemed the generated e-comic media to be valid and feasible. Additionally, it was determined that the media is beneficial in raising early children's awareness of flood mitigation. Another study carried out a second study in which they looked at the impact of digital learning media based on online learning for young children (Smeda et al., 2014). The study's findings showed that the media were useful for enhancing young children's flood catastrophe mitigation skills. Another study conducted looked at how Korean drama affected high school students' abilities to deal with disasters (Sholihah et al., 2020). According to the study's findings, showing Korean dramas about disasters helped high school pupils learn how to mitigate them. According to the findings of earlier studies, using digital learning was able to enhance students' comprehension of and capacity for disaster mitigation.

This study discovered that community-based web-based learning through digital learning can enhance university students' comprehension of disaster mitigation. This discovery in digital learning for disaster avoidance was novel because it had not been made in any prior studies. Several factors contributed to university students' increased understanding of catastrophe mitigation. One of them was the fact that students had more accessibility to community-based web-learning resources. Students had easier access to learning about disaster mitigation due to community-based web-learning tools. Students could quickly access learning resources about disaster mitigation via a web platform at any time and from any location, depending on their needs and convenience (Noviana et al., 2020; Nurcahyo, 2020). This indicates that, unlike traditional learning, they would not be constrained to a certain time or location. Students have access to the materials repeatedly as needed, could set their learning speed, and could learn autonomously. Additionally, students could get access to extra materials like simulations, articles, or movies that could help them better comprehend disaster mitigation (Noviana et al., 2020; Nurcahyo, 2020). This wider availability gives students the freedom to study disaster mitigation materials following their unique learning styles and rhythms, which may significantly improve student comprehension.

Another aspect was the ability of students to participate in an active learning community when using community-based web-learning media. In this situation, students had the chance to communicate online with other students and teachers through various web-based tools, such as forums, discussions, and study groups. This statement can be seen from the students' active discussion regarding the material presented in the discussion forum. Students exchange issues and problems related to disaster mitigation and provide comments to each other. Students might share their expertise, experiences, and various viewpoints on disaster mitigation through these exchanges (Dharma, 2019; Rambe, 2018) Students that participate in an active learning community can share knowledge, debate concepts, and give feedback to one another. Students' understanding of disaster mitigation may be widened and improved through this relationship and knowledge exchange. Through sharing experiences in an active learning community, students could develop fresh perspectives, a more rounded understanding of catastrophe mitigation, and new insights.

Students were able to use a variety of resources and interactive learning materials due to the development of community-based web-learning media. Students had access to case studies, learning videos, interactive simulations, and other digital resources through the web platform that had been specifically created to enhance learning. These interactive elements gave students the chance to participate actively in their education (Kaufmann, 2018; Yu et al., 2021). Students could use videos to help them understand complex concepts, participate in interactive simulations to experience the effects of disaster mitigation live or examine actual case studies to learn about practical mitigation techniques. Students were able to better understand disaster mitigation ideas as a result of the interactive aspects of the web-learning media, which also made learning more interesting and interactive for them.

Another element was the availability of additional materials like webinars, online workshops, or recorded lectures delivered by experts or practitioners related to disaster mitigation through the developed community-based web-learning media. Students might participate in webinars, online workshops, or recorded lectures delivered by experts or practitioners about disaster prevention through the web

platform. Students were given the chance to develop better understanding of current practices, associated research, and perspectives of experienced experts in disaster mitigation. Students could learn more about current disaster mitigation trends, engage in expert conversations, and develop a deeper understanding of related topics by participating in webinars or online workshops (Alkadri & Fauzi, 2021; Wardana et al., 2021). Students could also get knowledge from presentations made by professionals, both synchronously and asynchronously, due to access to recorded lectures. As a result, through the use of additional resources, students were able to get broader and more current insights into the field of disaster mitigation.

In general, the use of community-based web-learning resources in the study of disaster mitigation could improve university students' understanding through improved accessibility, active engagement in the learning community, use of interactive resources, collaboration, and access to additional pertinent resources. Students could gain a deeper understanding and the abilities necessary to deal with difficulties related to disaster mitigation in the future by making use of the potential of this community-based web-learning media. This research recommends that for readers to carry out this research, adequate technological facilities are needed for lecturers and students. Besides that, lecturers and students must also be trained to use this web-based learning media to make it easier to use in the learning process. This research also recommends that this web-based learning media can be used as an alternative to increasing students' understanding of disaster mitigation in higher education.

#### 4. CONCLUSION

A low understanding of disaster mitigation can be a problem for students living in disaster-prone areas, so efforts are needed to increase understanding of disaster mitigation. Based on the results of research conducted that. This study concludes that community-based web learning can help university students comprehend disaster mitigation. The study finds that this improved knowledge of disaster mitigation results from community-based web learning's wider accessibility, active participation in the learning community, usage of interactive tools, collaboration, and access to additional relevant materials.

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