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Role Playing Simulation Learning Method in Disaster-Prone Areas: Is It Effective in Improving Knowledge and Preparedness for Disasters?

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ABSTRACT

Indonesia is a disaster-prone country, especially in terms of geological disasters. Applying disaster education through simulation methods is expected to give the community the right knowledge and attitude toward disaster response. This study aimed to determine and analyze the knowledge and attitudes of students in higher education in responding to geological disasters through simulation learning methods. The population in this study was students of the Social Sciences Education Study Program from five Islamic universities in East Java, Indonesia, and the sample was 378 students. The method used was quantitative with univariate and bivariate data analysis. The study results from the analysis stated a significant difference between the knowledge and preparedness of geological disasters in students in the control group and the experimental group, with a P value of 0.0001. Thus, the knowledge and disaster preparedness level in students who received simulation learning was higher than in students who did not receive learning with the simulation learning model. This study implies that the simulation learning model can be used as a reference in implementing disaster education, especially in disaster-prone areas.

***Keywords*:**

Role Playing; Simulation; Knowledge; Preparedness; Disaster.

ABSTRAK

Indonesia adalah negara rawan bencana khususnya bencana geologi. Sehingga penerapan edukasi kebencanaan melalui metode simulasi diperlukan. Tujuan penelitian ini adalah mengetahui dan menganalisis

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pengetahuan dan sikap mahasiswa dalam merespon bencana geologi melalui pembelajaran simulasi. Populasi penelitian adalah mahasiswa Program Studi Pendidikan Ilmu Sosial di lima perguruan tinggi Islam Jawa Timur, Indonesia, dan sampel penelitiannya 378 mahasiswa. Metode yang digunakan adalah kuantitatif dengan analisis data univariat dan bivariat. Hasil penelitian menyebutkan terdapat perbedaan signifikan dengan nilai P 0,0001 sehingga siswa yang menerima pembelajaran simulasi lebih tinggi pengetahuan dan kesiapsiagaan bencananya dibandingkan siswa yang tidak menerima pembelajaran model simulasi. Implikasi dari penelitian ini adalah pembelajaran simulasi dapat dijadikan acuan dalam pelaksanaan edukasi kebencanaan khususnya di daerah rawan bencana.

***Kata kunci*:**

Role Playing; Simulasi; Pengetahuan; Kesiapsiagaan; Bencana.

1. Introduction

Disaster education is one of the important things to do in respond to disasters. Through the mandate of the Regulation of the Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Number 33 of 2019, the government established a Satuan Pendidikan Aman Bencana (SPAB) policy. However, not all school levels implement this policy, which is not intended for universities. The implementation of disaster mitigation education in schools is still partial and incidental (Y. Yani, Maryani, & Yani, 2024). Material about disaster education is usually only embedded in certain courses. The study of disasters is a course in the Social Science Education Study Program at the State Islamic University, and some are only the subject of one meeting in the course that covers the field of disasters.

If we look at it and learn the definition, disasters need more knowledge and preparedness. Disaster can be defined as an event or series of events that can threaten and disrupt life. Natural, non-natural, and human factors can cause disasters. These factors can cause loss of life, environmental damage, property loss, and psychological effects (Indonesia, 2007). There have been 149 disaster cases recorded in 73 countries since the beginning of 2017, with the trend and level of disaster occurrences assessed as increasing (Labrague et al., 2018). The frequency of disaster events internationally highlights the importance of disaster preparedness. Because it quickly affects education, social conditions, children's behavior, and the emotional development of the affected person (Perfect, Turley, Carlson, Yohanna, & Saint Gilles, 2016).

In general, the impact of disasters that occur increases due to the contribution of increased vulnerability both individually and in groups, the increasing population, the level of settlement density in high-risk areas, increasing terrorism problems, increasing dependence on technology, the use of natural resources that do not pay attention to the environment, increasing international mobility, and the increase in various viruses or infectious diseases such as the Covid-19 virus (Righi, Lauriola, Ghinoi, Giovannetti, & Soldati, 2021). Disasters certainly impact many things. They can

quickly affect education, social conditions, children's behavior, and the emotional development of the affected people (Perfect et al., 2016).

The different backgrounds of children, especially those whose lives are less fortunate, will have high vulnerabilities and risks. In this problem, of course, schools have a big role in restoring the mental health of children due to the trauma of disaster events (Newton, Keane, & Byrne, 2024; Rolfsnes & Idsoe, 2011). Schools can play a big role in recovering from the impact of disasters, especially in terms of human resources. Disaster risk reduction is a strategic step in minimizing the impact caused by a disaster (Prasetio, Arifianti, Hardjakaprabon, & Agustin, 2012; Tsubouchi & Yamaguchi, 2025). Risk reduction activities can be linked to learning activities from disaster theories, such as disaster education, preparedness, capacity building, and awareness-raising (Kitagawa, 2023; Suarmika, Arnyana, Suastra, & Margunayasa, 2022).

Therefore, disaster risk reduction efforts are very much needed by the Indonesian people. This is because Indonesia is one of the countries at high risk of disaster. Geologically, Indonesia is a region with the center of three active world plates and is an archipelago. So, based on location factors, Indonesia is very prone to disasters and requires efforts to build a society that has disaster resilience (Khusna et al., 2023; Pribadi et al., 2021). The region is located in a complex tectonic environment on the edge of an active plate, making the country highly vulnerable to natural disasters (Fakhruddin, Kintada, & Tilley, 2021; Gunawan, Meilano, Abidin, Hanifa, & Susilo, 2016). Based on disaster statistics data released by the National Disaster Management Agency (BNPB) for 3 periods, namely from 2022 to 2024, there were 81 geological disasters with 672 fatalities and 292,203 displaced people (BNPB, 2024). Based on the high incidence of disasters, efforts must be made immediately to conduct a study on risk reduction that can be carried out (Kronmüller, Atallah, Gutiérrez, Guerrero, & Gedda, 2017). Therefore, it is very important to emphasize the implementation of natural disaster risk reduction so that Indonesian people can pay more attention to their environment, because the disasters that occur also result in the loss of property and the deaths of hundreds of people (Chang, Pan, & Chen, 2024; Khusna, Sumarmi, Bachri, Astina, & Aristin, 2023). The existence of environmental problems that cause disasters is because humans cannot build principles, ways of life, ethics, and ways of thinking that are by their environment (Husamah, 2015). One of the strategic issues in disaster risk reduction is disaster education. However, existing disaster education does not yet have a focus on disaster education related to humanitarian logistics (Oktari, Munadi, Idroes, & Sofyan, 2020; Tahmidaten & Krismanto, 2019).

So, this study will conduct learning in disaster education by testing the effectiveness of disaster education in learning simulation role-playing models. In contemporary education, simulation-based learning is an important tool that universities use to facilitate and enhance the learning experience. A special focus on using simulation learning to improve students' knowledge and skills (Chang et al., 2024; Khalil, Author, Kamaruzzaman, & Ong, 2024). In addition, previous research also provides recommendations that disaster management activities through disaster education are at least 25% contained in prevention exercises (Ma, Chuang, & Chen, 2025). Simulation learning can be a teaching method, assuming that not all learning processes can be done directly on real objects. Previous

research has obtained evidence about the impact of simulation-based learning on students' high-level thinking (Chatpinyakoop, Hallinger, & Showanasai, 2024). In addition, previous research also explored students' experiences during simulation-based learning with a focus on communication skills (Skedsmo et al., 2023). Previous researchers also recommended that disaster education be continuously revived despite a school curriculum for disaster education. For lecturers at the university level, disaster education is an obligation to continue to be socialized. The method can be mentioned in every delivery of subject competency, occasionally trying to do an earthquake disaster simulation, as has been done (Yani, 2016).

So, this research will answer the recommendations of previous studies, namely by implementing disaster education and testing simulation learning. This research also has a novelty: measuring knowledge and preparedness for various geological disasters. The measurements used in previous studies are also still simple and do not reflect the actual magnitude of the construct. Therefore, this study fills the gap by assessing various threatening geological disasters' knowledge and preparedness attitudes. Finally, the results can help academics and various parties understand how simulation learning in disaster education should be designed for disaster knowledge and preparedness.

Therefore, this study aims to determine the level of knowledge and preparedness of students in carrying out disaster education and to test the effectiveness of simulation learning. This is very important because Disaster education is one of the most effective ways to manage the disaster process (Genç, Yıldız, Erdal, & Bilgili, 2025). This research will contribute to learning in disaster education and provide recommendations for government policies in implementing appropriate disaster education in disaster-prone areas such as Indonesia.

2. Methods

2.1. Research Design

The type of research used is quantitative research with a cross-sectional design, where the process of collecting and measuring variables is carried out simultaneously. This design is used to measure the student's level of knowledge about disaster preparedness. This research was conducted at a state Islamic University in East Java Province, Indonesia, with a Tadris or Social Science Education Program Study. There are five state Islamic universities: UIN Sayyid Ali Rahmatullah Tulungagung, IAIN Ponorogo, UIN Maulana Malik Ibrahim Malang, and UIN KH. Achmad Siddiq Jember and IAIN Madura.

2.2 Population and Sample

The sampling technique used is purposive sampling, where the researcher selects samples based on certain criteria relevant to the research objectives. The population of this study is sixth-semester students. Samples were chosen deliberately because they were thought to have the needed information. The number of samples selected for each university was two classes in the fifth semester, with details

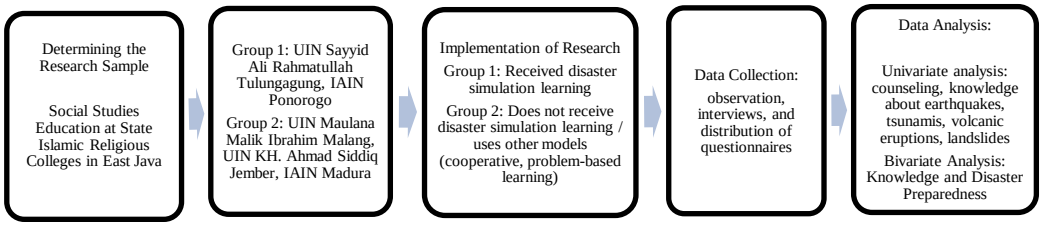
of 100 students of UIN Sayyid Ali Rahmatullah Tulungagung, 95 students of IAIN Ponorogo, 63 students of UIN Maulana Malik Ibrahim Malang, and 62 students of UIN KH. Achmad Siddiq Jember and 58 IAIN Madura students.

2.3 Types and Techniques of Data Collection

This study uses primary data collected from two groups of students: Group 1, students who take disaster management courses, and Group 2, students who do not receive disaster simulation learning but get disaster-related materials integrated into other courses. Group 1 is students at UIN Sayyid Ali Rahmatullah and IAIN Ponorogo, where students receive disaster simulation learning. Group 2 includes UIN Maulana Malik Ibrahim Malang, UIN KH Achmad Sidiq Jember, and IAIN Madura. Group 2 uses cooperative learning-based learning models for disaster management materials in the Semester Learning Plan document. The data collection technique was carried out by observation, interviews, and the distribution of questionnaires in 2024 for six months. Observations were made during the implementation of simulation learning. The interview used is a structured interview to obtain supporting data. The questionnaire provided included several questions to measure changes in knowledge and preparedness for disasters.

2.4 Data Analysis

Data analysis in this study was carried out using univariate and bivariate analyses. Univariate analysis was carried out on the variables used in this study. This analysis aims to see a picture of the frequency distribution of each variable studied. The results of this analysis will be presented in the form of a frequency distribution table. The data analyzed is related to knowledge and experience about several types of geological disasters. Meanwhile, Bivariate Analysis was used to see the difference in each research group's knowledge and preparedness level. This analysis will use inferential statistics, i.e., the T-test, because it compares two independent groups (comparing the average of two knowledge groups about geological disaster mitigation). Bivariate tests were used to see the effect of simulation learning on disaster education.



Picture 1. Research Flowchart

3. Results and Discussion

3.1 Students' Level of Knowledge and Disaster Preparedness

After implementing the learning, the questionnaire was distributed with details of 100 UIN Sayyid Ali Rahmatullah Tulungagung and 95 students from IAIN Ponorogo, hereinafter referred to as group 1. In addition, 63 questionnaires were for UIN Maulana Malik Ibrahim Malang, and 62 students of UIN KH. Achmad Siddiq Jember and 58 IAIN Madura students, hereinafter referred to as group 2. Univariate analysis was conducted to obtain various descriptions of the counseling activities that students have received and students' knowledge about disaster events, as follows:

Table 1. Distribution of Respondents by Extension

No.	Counseling	Answering "Yes"	
		Group 1	Group 2
1	Get Earthquake Counseling	98.5	54.3
2	Get Tsunami Counseling	72.8	35.9
3	Get Volcano Counseling	9.2	26.6
4	Get Land Movement Counseling	9.7	23.9

For analysis, the values of the counseling questions are added up, and then the values are grouped into two categories based on the values in Table 2 below:

Table 2. Distribution of Counseling Obtained by Students

Variable	Median	SD	Min- Mak	95%CI
Group counseling 1	6	0.757	5- 8	5.80- 6.01
Group counseling 2	5	1,516	4- 6	5.16- 5.63

The analysis results obtained the mean value of counseling for group 1 students was 6 (95% CI: 5.80-6.01), with a standard deviation of 0.757. The minimum counseling was five, and the maximum counseling was 8. From the results of the interval estimation, it can be concluded that 95% believe that the mean value of group 1 students who received counseling is between 5.80 and 6.01, and the distribution is not normal. So, the total counseling variable regarding disaster preparedness is categorized into two, namely Good (total value ≥ 6) and less (total value <6)

The analysis results obtained the mean value of group 2 students is 5 (95% CI: 5.19- 5.63), with a standard deviation of 2.532. The minimum counseling is four, and the maximum counseling is 8. From the results of the interval estimation, it can be concluded that 95% believe that the mean value of group 2 student counseling is between 5.19 and 5.63; the distribution is not normal. So, the total counseling variable regarding disaster preparedness is categorized into two. Namely, there is (a total value ≥ 5) and less (total value <5).

Table 3. Distribution of Respondents According to the Average Counseling Received by Students

Counseling	Group 1	Group 2
Complete	71.3	59.2
Incomplete	28.7	40.8

Total	100	100

The research results can be described in the frequency table above: 71.3% of students in group 1 received counseling on disaster preparedness, and 59.2% of students in group 2 did.

Based on data from the questionnaire on the knowledge variable, with 30 questions. Knowledge about disaster preparedness is calculated based on the respondent's answer, given a value of one (1) if wrong and a value of two (2) if the answer is correct.

Table 4. Distribution of Respondents According to Knowledge of Earthquakes

No	Earthquake Knowledge Questions	Answer Correctly	
		Group 1	Group 2
1.	What is meant by natural disaster?	85.1	91.8
2.	The phenomenon is known to state the earthquake condition	74.9	60.9
3.	Causes of earthquakes	33.3	27.2
4.	What would you do if an earthquake occurred and you were in a bad position? inside a high-rise building	84.6	63
5.	This type of building is considered the safest in the face of earthquakes.	95.4	60.9
6.	What would you do if this happened? An earthquake, and you were in the elevator?	94.4	90.2
7.	What would you do if an earthquake occurred and you were outside?	99	95.7
8.	What would you do if an earthquake occurred and you were in a vehicle?	99	94
9	What would you do if an earthquake occurred and you were on the ground floor?	89.7	81
10.	In your opinion, what are the potential risks in the school environment when an earthquake occurs?	93.3	89.7

Table 5. Distribution of Respondents According to Knowledge of Tsunami

No	Question	Answer Correctly	
		Group 1	Group 2
1	Does every earthquake cause a tsunami?	95.9	92.4
2	Tsunamis are mainly caused by:	92.3	92.9
3	Signs/symptoms of a tsunami	87.2	84.2
4	Characteristics of tsunami-resistant buildings/houses	47.2	40.8
5	What do you do if the seawater suddenly recedes?	96.4	94.6
6	Actions you take after an earthquake and a tsunami occur	83.1	76.1
7	Places to save yourself in the event of an earthquake or tsunami disaster	76.4	54.3

8	Plan for alertness to the possibility of a disaster	90.3	80.4
9	Do you know that there is a warning system/method for a tsunami?	77.4	64.1

Table 6. Distribution of Respondents According to Knowledge of Volcanic Eruption Disasters

No	Question	Answer Correctly	
		Group 1	Group 2
1	What is the definition of a volcano?	91.3	92.9
2	What is the recommended house model for the surrounding area? Mountain fire, to avoid the burden of volcanic ash deposits	30.8	22.3
3	What are the dangers of volcanoes?	90.8	90.2
4	Explain the level of active volcanic activity in Indonesia, which is classified from low to high.	52.8	48.9
5	How to avoid the dangers of hot clouds	29.7	28.3

Table 7. Distribution of Respondents According to Knowledge of Landslides

No	Question	Answer Correctly	
		Group 1	Group 2
1	Mention the types of land movement (landslides)	44.6	39.7
2	What are the factors that trigger landslides?	87.7	85.3
3	What are the common symptoms of landslides/landslides?	80	66.3
4	How to prevent landslide disasters	88.2	86.4
5	What are the signs that a landslide is about to occur?	81.5	77.2
6	Which is not a stage of landslide disaster mitigation?	52.8	52.2

3.2 The Effect of Role-Playing Learning on the Level of Knowledge and Disaster Preparedness in Students

For analysis, the scores from the knowledge questions were added up, and then the scores were grouped into two categories based on the scores in the following table 8:

Table 8. Distribution of Student Knowledge

Variables	Mean	SD	Min-Max	95%CI
Group knowledge 1	53.25	2,157	48- 58	52.94- 53.55
Group knowledge 2	51.23	2,532	41- 57	50.87- 51.61

The analysis results obtained the average value of knowledge of group 1 is 53.25 (95% CI: 52.94- 53.55), with a standard deviation of 2.157. The minimum knowledge is 48, and the maximum knowledge is 58. From the results of the interval estimation, it can be concluded that 95% believed that the mean value of knowledge of group 1 students is between 52.94 and 53.53, and the distribution is normal. So, the total variable of knowledge about disaster preparedness is categorized into two, namely good (total value $\geq$ 53.25) and less (total value < 53.25).

The analysis results obtained that the average knowledge and preparedness of group 2 is 51.23 (95% CI: 50.87- 51.61), with a standard deviation of 2.532. The minimum knowledge is 41, and the maximum knowledge is 57. From the results of the interval estimation, it can be concluded that 95% believed that the average value of knowledge of group 2 is between 50.87 and 51.61, and the distribution results are normal. So, the total variable of knowledge about disaster preparedness is categorized into two, namely good (total value ≥ 51.23) and less (total value < 51.23).

Table 9. Distribution of Respondents by Knowledge

Knowledge	Group 1	Group 2
Good	64.62	59.78
Not enough	35.38	40.22
Total	100	100

So, the study's results can be described in the frequency table 9 above: members of group 1 who have good knowledge about disaster preparedness are (64.62%), and members of group 2 who have good knowledge are (56.78%). After the univariate analysis, the next step was to conduct a bivariate analysis to compare the level of knowledge between group 1 and group 2 using the T-test. Here are the calculation results:

Table 10. Differences in Knowledge about Disaster Preparedness

Knowledge	Group 1	Group 2	T-test
Earthquake	18.49	17.54	0.0001
Tsunami	16.46	15.80	0.0001
Volcano	7.95	7.83	0.136
Land Movement	10.35	10.07	0.016
Total	53.25	51.24	0.0001

The average knowledge about earthquakes in Group 1 was 18.49, while for Group 2, the average knowledge about earthquakes was 17.54. The statistical test results obtained a p-value = 0.0001, meaning that at 5% alpha, there was a significant difference in the average knowledge about earthquakes between group 1 and group 2.

The average knowledge about tsunamis of Group 1 members was 16.46, while for Group 2, the average knowledge about tsunamis was 15.80. The statistical test results obtained a p-value = 0.0001, meaning that at 5% alpha, there was a significant difference in the average knowledge about tsunamis between students in group 1 and group 2.

The average knowledge about volcanoes in Group 1 was 7.95, while for Group 2, it was 7.83. The statistical test results obtained a p-value = 0.136, meaning that at 5% alpha, there was no significant difference in the average knowledge about volcanoes between Group 1 and Group 2 members.

The average knowledge of ground motion in group 1 was 10.35, while for group 2, it was 10.07. The statistical test results obtained a p-value of 0.016, meaning that at 5% alpha, there was a significant difference in the average knowledge of ground motion between students in group 1 and group 2.

Table 11. Average Distribution of Knowledge about Disaster Preparedness

Knowledge	Mean	Standard deviation	Standard error of the mean	P value
Group 1	53.25	2,157	0.154	0.0001
Group 2	51.24	2,532	0.187	

The average disaster preparedness of Group 1 was 53.35 with a standard deviation of 2.157, while the average knowledge of disaster preparedness of Group 2 was 51.24 with a standard deviation of 2.532. The results of the statistical test obtained a P value = 0.0001, meaning that at alpha 5%, there was a significant difference in the average knowledge of members of group 1 and group 2 or, in other words, the level of knowledge of members of group 1 was higher than that of group 2, this can be seen from the P value which is smaller than alpha 0.05.

3.3 Discussion

The type of simulation learning method used in this study is role-playing. This simulation learning method is directed to create historical, actual events, or events that may arise. The simulation method for the formation of knowledge and disaster preparedness in higher education consists of three stages, namely (1) the beginning of simulation learning, (2) the implementation of simulation learning, and (3) the closing.

First, the initial stage of the simulation, namely (1) the lecturer determines the topic or problem and the objectives to be achieved by the simulation, (2) the lecturer provides a description of the problem in the situation that will be accumulated, (3) the lecturer forms groups and determines the tools to be used, (4) the lecturer determines the players who will be involved in the simulation, the roles that the players must play, and the time provided, and (5) the lecturer allows the students to ask questions, especially to students who are involved in the simulation role-play.

The second stage, the implementation of the simulation, namely (1) the simulation begins to be played by the actor group, (2) the other students follow attentively, (3) the lecturer should provide assistance to actors who are having difficulties, and (4) the simulation should be stopped at the peak. This is intended to encourage students to think about solving the simulated problem.

The third stage, closing, is (1) the lecturer and students hold a discussion about the progress of the simulation and the story material that was simulated, and (2) the lecturer formulates a conclusion.

Picture 2. Earthquake Disaster Simulation in a University Building and Tsunami Disaster Simulation in a Sea Area Near The University

Based on the analysis results through the independent sample T-test, it can be seen that Group 1, with the simulation learning method, has a greater influence than Group 2 with the conventional learning method on disaster knowledge and preparedness. This is because students are more enthusiastic about participating in learning with the simulation learning method than learning with the conventional method. In line with previous research, which states that the simulation learning method provides a pleasant atmosphere, students will be actively involved in learning, so that students are more enthusiastic about participating in lessons and understanding the subject matter; student learning outcomes also increase (Masrita, Gonggo, & Mulyani Sabang, 2013). Simulation-based learning is a pedagogical model for deep learning (Levin, 2024).

The simulation method is one of the learning methods used in group learning. Previous research shows that simulation learning has significantly proven to increase team self-competence (Campbell, Ascenzi, Busch, & Baker, 2024). Experiential learning improves sustainability attitudes, teamwork, and self-confidence, and increases engagement so that learning outcomes influence sustainability attitudes (Adib, 2024; Waring, Moisi, Barrett, & Gordts, 2024). So, simulation learning methods influence students' disaster response attitudes.

Disaster response is an attitude shown to prevent, face, and overcome disasters. This is certainly supported by previous research, which states that human behavior is an important part of environmental change because human behavior affects the survival of all living things (Haryanto, 2014). This is because humans do more interventions or use of the environment, and can provide lessons in disaster management skills (Oktari, Shiwaku, Munadi, Syamsidik, & Shaw, 2015). So, a disaster response attitude has a very big influence on survival.

Simulation learning methods can also be considered one of the educational technology implementations in independent learning because they can form quality human resources, namely, student preparedness in facing natural disasters. Technology is useful for supporting the success of learning, so that it can achieve the expected goals (Khusna et al., 2022). Examples of technology implementation in education include learning media, learning resources, and learning methods. Thus,

in simulation learning, a lecturer or teacher must develop self-competence. This supports the results of previous research, if simulation learning provides in-depth learning opportunities for the professional development of lecturers (Levin, 2024). Disaster simulation provides an opportunity for effective and innovative educational implementation (Wong et al., 2022).

The results of previous research stated that student learning outcomes increased compared to previously using simulations; students admitted that they were enthusiastic and not bored, so that students could more easily understand the material taught by lecturers (Arifin, Prastowo, & Harijanto, 2022). The study provides a statement that simulation learning only has an impact on cognitive aspects. The same thing in previous studies showed an increase in knowledge scores when earthquake simulation learning was carried out, from an initial score of 40-50 to 80-100 at the time of evaluation (Evie, Hasni, Azwar, & Saman, 2022). The findings of this research complement previous research, which found that simulation learning does not affect cognitive aspects, such as knowledge and understanding, or students' psychomoral abilities, such as disaster preparedness. Thus, simulation learning is effectively used in learning, especially in disasters.

By forming in-depth knowledge and proper preparedness, disaster resilience will be achieved, which is highly desired by disaster-prone countries. Of course, disaster resilience is logical, important, and beneficial for individuals, organizations, industries, and governments (Khan et al., 2022). However, natural disasters disproportionately affect different regions and social demographics, leading to spatial inequalities in disaster exposure (Chen & Li, 2025). So, it is very important to implement disaster education using simulation learning. The role of proper disaster education will be able to impact not only individuals who are trained and have the right knowledge about responding to disasters, but also help others when responding to disasters, and help in preventing things that can be life-threatening (Tsai, Chang, Shiau, & Wang, 2020). This is reinforced by research that argues that faith-based educational institutions' role is good structure, group involvement in activities, a close network, and theological perspectives, providing opportunities to distribute initiatives and ideas to reduce disaster risk (Joakim & White, 2015).

4. Conclusion

This study provides an overview where the average level of knowledge and preparedness of students who receive simulated learning through lectures is categorized as good (total score ≥ 51.23). In contrast, students who do not get simulation learning are categorized as poor (total score < 51.23). In addition, the results of the bivariate statistical test obtained a value of P = 0.0001, meaning that there is a significant difference in the average knowledge of group 1 members with group 2 or, in other words, the level of knowledge of group 1 members is higher than group 2, this can be seen from the P value that is smaller than alpha 0.05. Based on the analysis results through an independent sample T-test, it can be seen that Group 1, with the simulation learning method, has a greater influence than Group 2 with the conventional learning method on disaster knowledge and preparedness.

The implications of this research can be used as a reference by teachers or lecturers in applying simulation learning in disaster education in educational institutions, especially in disaster-prone areas.

In addition, providing input for government policies to make disaster education something important to be applied at all levels of education. This study has limitations because it only assesses the aspects of knowledge and preparedness for natural disasters, namely disasters caused by geological activities. Thus, this study recommends that further researchers conduct simulation learning assessments in disaster education on other aspects.

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