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Digital Literacy Based on Disaster Mitigation Scratch Design Game on Disaster Mitigation Cognitive of Elementary School Students

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Abstract

The target partner of this Community Partnership Program is Muhammadiyah 01 Creative Elementary School, Lumajang, which is located in an area prone to natural disasters, requiring further intervention. This is a crisis for Muhammadiyah 01 Creative Elementary School, Lumajang, which can reduce the welfare of teachers and students with the emergence of anxiety and fear of the threat of natural disasters. This service aims to provide a new atmosphere and spirit in disaster mitigation learning, which would be implemented with scratch games according to the needs of digital-based education by introducing a disaster mitigation scratch game application. The method of implementing the activity uses PAR (Participatory Action Research) through discussion, mentoring, and training. The training conducted for 1 week effectively increased cognition and changes in respondent attitudes. Evidenced by the results of the pre-test, 45 students had a low level of knowledge, 56.25%, 32 other students had a moderate level of disaster mitigation knowledge of 40%, and three other students had a high level of knowledge related to moderate disaster mitigation of 3.75%. However, after being given counseling and training using the Scratch Design Game Application. The post-test results showed a significant increase, including a drastic increase in the high level of knowledge related to disaster mitigation by 83.75%. The cognitive improvements students possess are expected to increase awareness and preparedness for disasters that could occur at SD Kreatif Muhammadiyah 01 Lumajang.

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INTRODUCTION

The target partner of this Community Partnership Program is Muhammadiyah 01 Lumajang Creative Elementary School. When it was established, Muhammadiyah 01 Lumajang Creative Elementary School was located at Jl. Brantas No. 7 Jogoyudan, Jogoyudan, Lumajang District, Lumajang Regency, East Java. Occupying land and buildings covering an area of 584 m^2. The land is one of Muhammadiyah's charitable

efforts, which was built from reclamation results, proven by the existence of a certificate of use rights from the Lumajang City Land Office and proven by a Permit. In its development, Muhammadiyah 01 Lumajang Creative Elementary School, for several periods, was still developing with various problems because the facilities and infrastructure for learning media were not optimal. At the same time, various series of natural disasters occurred in the school area, namely the Lumajang area (Zagarino et al., 2021). This condition spurred the school to want to develop learning media that is implemented for disaster mitigation emergency response, to provide a new atmosphere and new spirit in disaster mitigation learning that would be implemented with scratch games according to the needs of digital-based education, finally named Muhammadiyah Creative Elementary School 1 Lumajang by launching the scratch game application (Isbah, 2022; Sari et al., 2023; Troiano et al., 2020).

Creative Elementary School Muhammadiyah 01 Lumajang, as one of the educational institutions, has a very important role in environmental problems, so cooperation with various parties is possible, by creating an easily accessible social network. For this reason, Creative Elementary School Muhammadiyah 01 Lumajang has the potential to partner with organizations, government, and the community in the fields of education, social, and health in building a healthy environmental area so that it can have an impact on improving welfare and realizing optimal public health (Zagarino et al., 2021). This has become a crisis for Muhammadiyah 01 Creative Elementary School, Lumajang, which has disrupted the existence of teachers and students, increasing anxiety and fear of the threat of natural disasters. The crisis experienced by Muhammadiyah 01 Creative Elementary School, Lumajang, is an event that is likely to affect individual teachers and students, so they must face it, whether they like it or not. The area of this elementary school is close to the school with a series of threatening events such as floods, landslides, volcanic eruptions, forest fires, tornadoes, and earthquakes. These conditions can result in changes in life patterns and environmental damage, loss of life, loss of property, and psychological impacts (Aziz & Lakoro, 2023; Zagarino et al., 2021). Therefore, as part of the educational community group, Muhammadiyah Creative Elementary School 01 Lumajang must have information in the form of deeper knowledge about being resilient in everyday life, both in the school environment, family, and society.

In the results of the discussion, there were problems faced by the Muhammadiyah 01 Lumajang Creative Elementary School. The school said that its location, which is in a mountainous area, often makes them worried and afraid of the threat of natural disasters. The crisis experienced by Muhammadiyah 1 Lumajang Creative Elementary School is leading to instability and danger that affects individual teachers and students, so they have to face it whether they want to or not. The area of this elementary school is very close to a series of threatening events such as floods, landslides, volcanic eruptions, forest fires, tornadoes, and earthquakes. These conditions can result in changes in life patterns, loss of life, environmental damage, loss of property, and psychological impacts. The problem of lack of knowledge related to disaster mitigation, especially volcanic eruptions in the school environment, is a special concern for Muhammadiyah Lumajang Creative Elementary School, especially since there has been no handling or education program provided to teachers and students in the school environment regarding what initial actions should be taken and what to prepare for emergency conditions when a disaster suddenly occurs, especially in areas prone to volcanic eruptions (Cornelius et al., 2024).

This devotion is motivated by Indonesia, which is a country with a high risk of vulnerability to the threat of disasters. Based on risk ranking data in the INFORM REPORT 2022 report, Indonesia is ranked sixth in the world as a country with the highest risk due to natural disasters (Euro-Mediterranean Center on Climate Change &

Joint Research Centre of European Commission, 2022). The high risk of disaster impacts cannot be separated from the location of the territory of the Republic of Indonesia, which is in an area that is suitable to be called a disaster supermarket. In addition, the intensity and risk of disasters in Indonesia are increasing along with climate change. Indonesia is one of the countries most vulnerable to climate change 7. Seven cities in Indonesia are included in the 136 priority locations for disaster risk reduction (PRB) in the 2019-2024 medium-term development framework. (RPJMN), and also included in the list of 50 (fifty) areas prone to climate change in the National Action Plan-Climate Change Adaptation (RAN-API) in 2018 (KNLH, 2018). One of these cities is Lumajang. Therefore, these seven cities, one of which is Lumajang, a priority city in Indonesia, can be encouraged to become a disaster and climate change resilient city in Indonesia.

Based on the results of observations and interviews with one of the teachers at SD Kreatif Muhammadiyah Lumajang, data was obtained that most of the school parties, both teachers and students, do not know how to carry out mitigation when a disaster occurs and what to do when an emergency occurs, either in the initial process, evacuation or rehabilitation. Disaster education in Indonesia is hampered by three main things, namely the low ability of teachers to teach disaster education, the availability of teaching materials related to disaster education, which is still limited, and the weakness of existing policies related to disaster-safe schools (Suarmika & Utama, 2017). Meanwhile, mitigation is important because it can help reduce the negative impacts of natural disasters or disasters caused by human factors. From the results of the interview, there were two problems (Dwijayanti, 2022).

First, the lack of knowledge related to disaster mitigation, especially volcanic eruptions in the school environment, is a special concern for the Muhammadiyah Creative Elementary School in Lumajang. However, there has been no handling or education program provided to teachers and students in the school environment regarding what initial actions should be taken and what to prepare for emergency conditions when a disaster suddenly occurs, especially in areas prone to volcanic eruptions and earthquakes and several other disasters such as landslides, tornadoes, floods and forest fires (Dwijayanti, 2022; Zagarino et al., 2021). Second, not all received socialization about disaster mitigation, especially for school committees. This was obtained from the results of interviews conducted by the team, which showed that most school committees did not understand the initial handling of the evacuation process when a disaster emergency occurred. Third, there is no learning media related to disaster mitigation at Muhammadiyah 01 Lumajang Creative Elementary School. The area of this elementary school is a disaster-prone area that has often experienced problems in recent years because it is located in a mountainous area. This is a crisis for Muhammadiyah Lumajang Creative Elementary School, disrupting the welfare of teachers and students with the emergence of worry, anxiety, and fear of the threat of natural disasters.

From these problems, the team would conduct socialization activities, training, implementation of innovation, mentoring, and evaluation, as well as the sustainability of the disaster mitigation program at SD Kreatif Muhammadiyah 01 Lumajang. The innovation media is in the form of digital literacy based on disaster mitigation scratch design games, where this educational media can help schools in disaster preparedness learning activities and increase knowledge related to natural disaster mitigation activities (Kamal, Lina, & Haris, 2018). So the purpose of implementing community service activities is to provide a new atmosphere and enthusiasm in disaster mitigation

learning, which would be implemented with scratch games according to the needs of digital-based education by introducing a disaster mitigation scratch game application.

METHODS

This community service activity was carried out in October 2024 at Muhammadiyah Creative Elementary School 01, Lumajang. According to figures 1 (a) and (b), this school is located in an urban area and is close to road access.

(a) (b)

Figure 1 (a) School front view and (b) Condition of the right side of the Muhammadiyah 01 Creative Elementary School Building in Lumajang

The target participants of the activity are 80 students. The implementation of this activity includes disaster mitigation counseling to increase knowledge by using the Disaster Mitigation Scratch Design Game application. The implementation of Community Service (PkM) goes through several stages, namely:

1. Socialization
   The initial activity was socializing the PkM team's work plan with partners. The PkM team conducted observations and discussions with the principal of Muhammadiyah 01 Lumajang Creative Elementary School and other teachers to determine the form of activities, time, and place, and explain the plan for the next stages.
2. Preparation
   The PkM team prepares the necessary facilities and infrastructure and arranges to reconfirm participants' presence in scheduled community service activities.
3. Implementation
   The implementation activities, by providing disaster mitigation materials and demonstrations of the use of the Disaster Mitigation Scratch Design Game application, were carried out with 80 students, as shown in Figure 2.

Figure 2 Socialization of the use of scratch design game applications for students

The implementation was carried out in four sessions, namely (1) conducting a pre-test, aimed at determining participants' knowledge level regarding disaster mitigation, before being given training. Session (2) provided training on general disaster mitigation material, causes, and prevention. Session (3) was a practice using the Disaster Mitigation Scratch Design Game application to provide students with an interest in learning disaster mitigation. The activity was closed with session (4) conducting a post-test to determine the level of knowledge of participants regarding disaster mitigation (Kaspari & Masruroh, 2024).

4. Evaluation

Evaluation is conducted to measure students' cognitive level regarding the activities carried out. It is conducted by comparing the level of knowledge in the pretest and posttest. Assessing students' knowledge is done descriptively towards acquiring knowledge, both before the implementation of the activity (pre-test) and after the implementation of the activity (post-test).

RESULTS AND DISCUSSION

The activity was carried out in early October 2024, starting with socialization at the target location represented by the Principal of Muhammadiyah Creative Elementary School 01 Lumajang. The activity continued with preparation for 1 week and the implementation of activities consisting of 4 sessions: pre-test session, disaster mitigation training session, demonstration session with the Scratch Mitigation Disaster design game application, and closed with a post-test session. Evaluation was carried out after implementation by looking at the baseline data of student knowledge and the cognitive trends of respondents from the pre-test and post-test scores. Characteristics of respondents based on the results of the initial assessment of students' knowledge levels related to Disaster Mitigation. Respondent characteristics based on basic data on students' knowledge levels are shown in Table 1.

Table 1 Respondent characteristics based on baseline data on students' knowledge levels

Category	Frequency (n)	Percentage (%)
Disaster	45	68.75%
Mitigation	32	27.5%
Cognitive	3	3.75%

Based on Table 1, the distribution of the respondents' knowledge level from the pre-test results shows that most knowledge levels decreased. A total of 80 students who were respondents knew disaster mitigation. Description of the distribution of knowledge from the pre-test and post-test results after being given disaster mitigation counseling using the disaster mitigation scratch design game-based application.

Based on the disaster mitigation knowledge table data in Figure 3, it was found that before the program was implemented, there were 45 students with a low level of disaster mitigation knowledge of 56.25%, 32 other students with a moderate level of disaster mitigation knowledge of 40% and 3 other students with a high level of knowledge related to disaster mitigation of 3.75%. After the material delivery activity was carried out, the increase occurred very rapidly in the disaster mitigation knowledge level graph; there was a significant increase, including a drastic increase from a high level of knowledge related to disaster mitigation of 83.75%. Based on the disaster mitigation knowledge table data, it was found that before the program was implemented, there were 45 students with a low level of disaster mitigation knowledge of 56.25%, 32 other students with a moderate level of disaster mitigation knowledge of 40% and 3 other

students with a high level of knowledge related to disaster mitigation of 3.75%. After the material delivery activity was carried out, the increase occurred very rapidly in the disaster mitigation knowledge level graph; there was a significant increase, including a drastic increase from a high level of knowledge related to disaster mitigation of 83.75%. The use of scratch game applications for disaster mitigation education can provide significant results, especially in increasing student awareness and preparedness for natural disasters that often occur in the school area (Aziz & Lakoro, 2023; Cornelius et al., 2024).

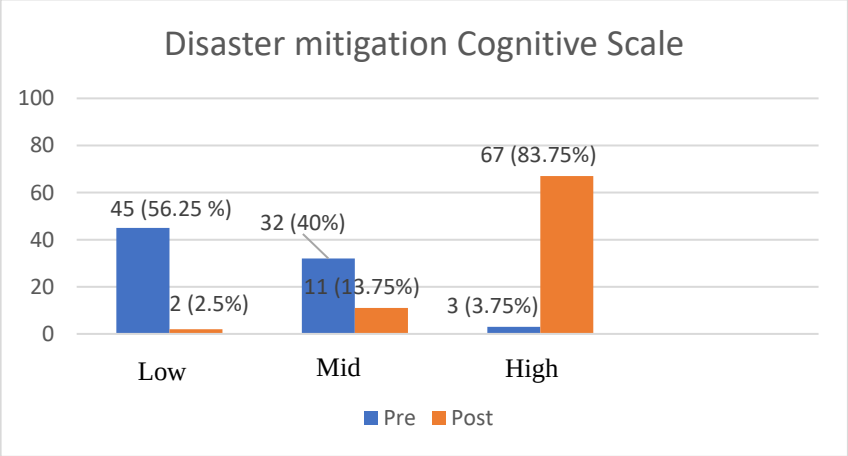

Figure 3 Disaster mitigation cognitive of respondents

After using the scratch game application, students can be better prepared for various natural disasters. They would learn mitigation steps such as how to evacuate and protect valuables. The scratch game application provides learning materials designed for direct experience that are difficult to obtain from traditional media (Isbah, 2022). Through the scratch game application, people can undergo more realistic evacuation training, which will prepare them to evacuate themselves and their families quickly and safely when a natural disaster occurs (Logayah et al., 2022). The experience that scratch game apps provide also allows this practice to be done without any real risk (Kamal et al., 2018; Kaspari & Masruroh, 2024). The innovation applied to partners is an innovative learning media using the Scratch Game. This game is used as a learning medium in environmentally aware schools and for disaster mitigation. This application will direct users to log in and train on knowledge related to disaster mitigation. The advantage of this tool is that it is a practical learning medium, easy to use by anyone, and fun, so that it can increase students' interest in studying environmental health and disaster mitigation materials (Camilla & Ningrum, 2023). Here is an example of a disaster, a scratch game tool (Aziz & Lakoro, 2023; Sari et al., 2023; Troiano et al., 2020).

Digital literacy based on disaster mitigation scratch design game developed with the Android system can be a learning tool for elementary school children, especially to increase knowledge related to disaster mitigation, thus creating a disaster-resilient society. Children can play while learning, so that students do not get bored easily, and learning feels fun (Makrifah & Sudarmilah, 2019). Digital literacy activities based on disaster mitigation scratch design games, students can directly learn while playing (Aziz & Lakoro, 2023). Thus, they will easily understand how to mitigate before and after a disaster, the tools that must be prepared, and so on. After using this game, students can be better prepared to face disasters.

CONCLUSION

Based on the results of the activity, the use of the disaster mitigation scratch game application as an educational media has had a significant impact on increasing students' knowledge about disaster mitigation at SD Kreatif Muhammadiyah 01 Lumajang. Before being given counseling, it was found that the majority had a low level of knowledge related to disaster mitigation, with 45 students (56.25%). However, after being given counseling and socialization using the Scratch Game Application, it showed a significant increase, including a drastic increase from a high level of knowledge related to disaster mitigation of 83.75%.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

The first, second, and third authors conceived of the presented idea and supervised the findings of this work. The first, fifth, and sixth authors developed the theory and performed the computations. The fourth and fifth authors verified the analytical methods and encouraged the publication of the results. All authors discussed the results and contributed to the final manuscript.

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