Original Article

Effect of Roleplay Tabletop Disaster Simulation on Flood Preparedness Attitudes Among Junior High School Students

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Abstract

Background: Disaster preparedness training is essential for junior high school children as a vulnerable group to increase awareness and preparedness for disasters. RTDS is an appropriate intervention in improving disaster preparedness.
Objective: This study aims to determine the effect of tabletop roleplay disaster simulation on students' flood disaster preparedness attitude at SMPN 1 Muncar in 2024.
Methods: A pre-experimental one-group pre-test and post-test design was used in this study, involving 30 respondents selected through a purposive sampling technique. A role-playing tabletop disaster simulation was used as the independent variable instrument to measure its effect on students' preparedness attitudes as the dependent variable. To measure the attitude of flood disaster preparedness in junior high school students using a questionnaire on the attitude of student preparedness in facing flood disasters. The questionnaire has been tested for validity and reliability. The data analysis method used is the Wilcoxon test.
Results: The results of the analysis showed that after being given the Roleplay Tabletop Disaster Simulation (RTDS), students' disaster preparedness attitudes increased significantly. Before the intervention, 63.0% of respondents were in the low category, while after the intervention, 87.0% of respondents were in the very high category. Wilcoxon test showed that this difference was significant (P = 0.000 < 0.05), indicating the effect of RTDS on students' disaster preparedness.
Conclusion: RTDS helps students understand safety procedures and improves their adaptability during disaster events.

Keywords: Disaster Simulation; Flood Preparedness; Preparedness Attitude, Roleplay Method; Tabletop Exercise;

INTRODUCTION

Indonesia, as an archipelago at the intersection of four tectonic plates and located in a tropical climate region, represents one form of vulnerability that affects the intensity of natural disasters, Indonesia ranks 6th among countries with high flood intensity. (1). Floods, in particular, are a serious problem as they can disrupt human activities, damage buildings, and

even cause loss of life and property (2). Disaster preparedness is very important, especially in dealing with floods that can occur suddenly.

According to data from the World Meteorological Organization (2024) during 2023 the number of flood victims had reached 1,8 million (3). Badan Nasional Penanggulangan Bencana (2024) stated that there were 1,255 cases of flooding in Indonesia during 2023 (4). One of the flood events in East Java Province that often occurs is in Banyuwangi Regency. Banyuwangi Regency has experienced at least five flood events every year since 2016—2020 (5). Heavy rains that flushed the Banyuwangi area caused a number of rivers to overflow in various areas, including in Muncar District. Due to the high water discharge, five villages in Muncar Sub-district were flooded up to three meters high. The results of a preliminary survey of 9 students on November 17, 2023 at SMPN 1 Muncar showed that only 22% of respondents stated that they had received disaster preparedness training. In addition, as many as 78% of them said that their knowledge about disaster management was still lacking and they were still not prepared to deal with disasters if they occurred at any time.

Preparedness is not just about logistics but also involves empowering students as potential first responders. Research indicates that preparedness training significantly enhances students' readiness (6). Effective preparedness includes knowledge dissemination, appropriate planning, and coordination to mitigate risks and minimize harm. This importance is recognized under Law Number 24 Year 2007 on Disaster Management. Despite increasing awareness, studies show that preparedness levels across individuals, families, schools, and government institutions in Indonesia remain inadequate (7). Disaster preparedness is measured through key indicators such as awareness, attitudes, early warning response, and resource mobilization (8,9). Unfortunately, traditional disaster education methods often fail to engage students effectively.

Educational institutions play a pivotal role in equipping communities with practical disaster management skills. However, conventional tools like lectures, pamphlets, and videos offer limited engagement (10,11). Tabletop Disaster Simulation (TDS) has emerged as a more interactive and effective learning method. This technique enables students to assume roles and make decisions in a simulated disaster environment, thereby enhancing critical thinking, empathy, and collaborative problem-solving (6,10). International frameworks such as the Sendai Framework for Disaster Risk Reduction emphasize the importance of education in building disaster resilience (12). TDS aligns with this global strategy by fostering active participation and localized learning. It provides a cost-effective, easily implemented solution suitable for classroom settings.

Based on previous research, tabletop simulation can provide benefits in enhancing participants' understanding, self-assurance, and awareness regarding their roles and duties in disaster management. The results also show that tabletop simulation training can improve participants' disaster-related knowledge and attitudes. In addition, tabletop simulation is also well-received due to its cost-effectiveness in disaster education. Through this simulation, participants actively participate and can retain the information provided, so tabletop simulation is more interesting and effective than other disaster preparedness methods. This study is theoretically informed by constructivist theory, which holds that students learn best when actively involved in constructing their own understanding through real-world experience. RTDS, as a simulation-based method, enables students to internalize disaster-related concepts by participating directly in realistic scenarios. This approach also draws from Kolb's Experiential Learning Cycle, where learners progress through stages of experiencing, reflecting, conceptualizing, and applying. These theoretical lenses guided both the structure of the intervention and the interpretation of its outcomes. Accordingly, this study seeks to assess the impact of tabletop roleplay disaster simulations on the flood preparedness attitudes of students at SMPN 1 Muncar, Banyuwangi.

METHODS

Study Design

This study utilized a pre-experimental design with a single-group pre-test and post-test approach to determine the effect of tabletop roleplay disaster simulation on students' flood disaster preparedness attitude

Participants

The population of this study consisted of all 822 students at SMPN 1 Muncar. where the samples taken in this study were VII and VIII grade

students of SMPN 1 Muncar totaling 30 students using Sugiyono's minimum sample guidelines, 2017. Samples were selected using purposive sampling method with inclusion criteria, namely students who have not received disaster preparedness training, students in grades seven and eight who agreed to take part as respondents, students who are not preparing for graduation exams. The exclusion criteria for this study are Students who have activities outside of school, Students who were sick during the disaster preparedness training process, and Students with physical disabilities.

Intervention protocol (Special for experimental study)

The Roleplay Tabletop Disaster Simulation (RTDS) intervention included the provision of educational materials on flood disasters, mitigation strategies, and preparedness efforts, followed by tabletop simulation activities. A total of 30 respondents were divided into three groups, each consisting of 10 students. To maintain consistency across groups, standardized modules, identical scenarios, and the same trained facilitators were used. Each group participated in the intervention over a three-day period. On the first day, each group completed a pre-test, received the educational material, and engaged in the roleplay simulation for a total of 120 minutes. The second day involved additional material presentation and continued simulation. The third day concluded with a final simulation session and administration of the post-test. All sessions were conducted in the same classroom setting to minimize variability.

Instrument for quantitative study

A role-playing tabletop disaster simulation was used as the independent variable instrument to measure its effect on students' preparedness attitudes as the dependent variable. To measure the attitude of flood disaster preparedness in junior high school students using a questionnaire on the attitude of student preparedness in facing flood disasters that has been modified by Ariningtyas before and after the intervention (13). The questionnaire consisted of 12 items covering four key indicators: acceptance, response, appreciation (respect), and responsibility. It employed a 4-point Likert scale with the following response options: (1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree. Total scores ranged from 12 (minimum) to 48 (maximum). Preparedness attitude levels were categorized based on the total score, with the following cut-off points: Very high (39-48), High (30-38), Low (21-29), Very low (12-20).The preparedness attitude scale is structured using a 4-point Likert scale with the following options: (1) Strongly Disagree, (2) Disagree, (3) Agree, (4) Strongly Agree. The total score ranges from 12 (minimum) to 48 (maximum). Preparedness attitude levels were categorized based on total questionnaire scores (range: 12–48), with cut-off points defined as follows Very high (39-48), High (30-38), Low (21-29), Very low (12-20). The questionnaire was tested for validity and reliability using SPSS. The calculated r-value for all items was greater than 0.361 (r-table), and the Cronbach's Alpha coefficient was 0.793,, It is concluded that the attitude variable's items demonstrate validity and reliability.

Data Collection procedure

Before conducting research, researchers first made a submission of a preliminary data request letter from PPPM STIKES Banyuwangi which was submitted to SMPN 1 Muncar Banyuwangi. Then get a reply letter from SMPN 1 Muncar Banyuwangi regarding permission to conduct research. after that, selecting respondents using purposive sampling technique, and 30 respondents were taken. Then, provide an explanation of the research to be carried out and do inform consent or signing if willing to become a respondent in the study. Then, giving a questionnaire to measure the level of preparedness attitude before the Roleplay Tabletop Disaster Simulation (RTDS) intervention. Next, giving material as well as RTDS simulation, Afterwards, participants were given a questionnaire to evaluate their preparedness attitude after the Roleplay Tabletop Disaster Simulation (RTDS) intervention.

Data Analysis

The data analysis method used is the Wilcoxon test because this study is comparative and the data are ordinal. The test obtained significant results $p = 0.000$ ($p < 0.5$) means that there is an effect of Roleplay Tabletop Disaster Simulation (RTDS) on students' flood disaster preparedness attitudes at SMPN 1 Muncar Banyuwangi.

Ethical Considerations

This research has conducted an ethical feasibility test at KEPK STIKES Banyuwangi and declared ethical pass on June 12, 2024 with

number 164/01/KEPK-STIKESBWI/VI/2024. Ethical protocols included obtaining ensuring voluntary participation, maintaining confidentiality, and protecting the rights and well-being of minors. Emphasis was placed on informed consent, anonymity, data protection, fairness, and non-maleficence.

RESULTS

Table 1. Respondent Characteristics by Gender in Students of SMPN 1 Muncar Banyuwangi 2024 (n=30)

Age Group	Gender		Total
	Male	Female	
12-15	9	21	30

From Table 1, it can be observed that most students at SMPN 1 Muncar Banyuwangi 2024 are female, namely 21 students or (70%) of the total sample of this study. In addition, all students of SMPN 1 Muncar Banyuwangi 2024 are between 12 to 15 years old, namely 30 students or (100%) of the total sample.

Table 2. Distribution of Scores Before And After Giving Roleplay Table Top Disaster Simulation (RTDS) on Flood Disaster Preparedness Attitudes in Students of SMPN 1 Muncar Banyuwangi 2024

Category	Pretest					Posttest					Wilcoxon Signed Rank Test	Z
	n	%	min	max	median	n	%	min	max	median		
Very High	0	0	2	3	2.00	26	87	3	4	4.00	0,000	-4.930
High	11	37				4	13					
Low	19	63				0	0					
Very Low	0	0				0	0					
Total	30	100				30	100					

From the analysis shown in Table 2, during the pretest, the majority of respondents (63%) were categorized as low, while 37% were in the high category. No respondents fell into the very high or very low categories. The median pretest score was 2.00, with a minimum of 2 and a maximum of 3, indicating that students' flood disaster preparedness attitudes were generally suboptimal prior to the intervention.

Following the intervention (posttest), a notable improvement was observed. A total of 87% of respondents were classified as very high, while the remaining 13% were in the high category. No respondents were categorized as low or very low. The median posttest score increased to 4.00, with scores ranging from 3 to 4, indicating a significant shift toward stronger preparedness attitudes. Similar results were observed in community, where Tabletop Disaster Simulation (TDS) effectively improved tsunami preparedness (14)

The Wilcoxon Signed Rank Test yielded a Z value of -4.930 with a p-value of 0.000 ($p < 0.05$), indicating a statistically significant difference between pretest and posttest scores. The negative Z value reflects that posttest scores were consistently higher than pretest scores. Therefore, it can be concluded that the Roleplay Tabletop Disaster Simulation (RTDS) was effective in enhancing students' flood disaster preparedness attitudes at SMPN 1 Muncar Banyuwangi in 2024.

DISCUSSION

The results of this study demonstrate a substantial enhancement in students' flood preparedness attitudes following the implementation of the Roleplay Tabletop Disaster Simulation (RTDS). Prior to the intervention, 63.0% of students were categorized as having low preparedness, reflecting a significant gap in knowledge,

attitude, and readiness. Post-intervention data revealed that 87.0% of students reached the very high preparedness category. The statistical analysis via the Wilcoxon Signed Rank Test (p = 0.000) confirmed a significant effect of RTDS on preparedness attitudes, underscoring the intervention's impact not only in statistical terms but also in its practical, real-world implications. This is consistent with previous study, who highlighted that social factors, including trust, participation, and collective efficacy, play a critical role in shaping community disaster preparedness. Through group simulations like RTDS, these social elements are activated in the classroom setting, promoting collaborative decision-making (15).

RTDS leverages experiential learning to simulate realistic disaster scenarios, aligning with constructivist learning theory which posits that learners build knowledge through active engagement and contextualized experiences (16). The simulation-based approach enabled students to roleplay decision-making processes, practice collaborative planning, and reflect on their actions—all of which are critical competencies in disaster management. As students assume roles and confront simulated emergencies, they transition from passive recipients of information to active problem-solvers. This transformation fosters deeper cognitive and emotional engagement, which in turn cultivates behavioral readiness (17,18).

Improvements were observed across all four attitude indicators: acceptance, responsiveness, appreciation, and responsibility. Rather than treating each indicator in isolation, these dimensions can be reframed into a broader thematic framework encompassing cognitive (knowledge acquisition), affective (empathy and concern), and behavioral (readiness to act) domains (19). RTDS promotes awareness by presenting realistic threats, enhances empathy through collaborative interaction, and instills accountability by assigning responsibilities in simulation scenarios. Such multidimensional learning is rarely achieved through traditional lecture-based methods (20). This aligns with previous study, who found that both knowledge and attitudes are significant predictors of community preparedness, emphasizing the need for interventions that build not just cognitive understanding, but also emotional and behavioral readiness (21).

The age range of participants (12–15 years) is critical in shaping disaster preparedness. Adolescents in this developmental stage are cognitively curious yet emotionally impressionable. These findings are supported by previous study, who found that school-based disaster education significantly enhances children's perception, knowledge, and preparedness in managing flood risks, especially when integrated with interactive and context-specific learning methods (22). Previous research highlights that adolescents are open to new ideas, but their emotional maturity and decision-making abilities are still developing (2,23). RTDS provides a structured yet engaging avenue to harness this cognitive curiosity while simultaneously guiding students toward constructive behavioral norms during crises. This reinforces the importance of introducing disaster education at the junior high school level, where foundational attitudes and values can be instilled.

Gender dynamics also emerged as a relevant factor. With 70% of participants being female, This study is in line with previous research, which suggests that women and girls face disproportionate vulnerability during disasters due to limited access to information, cultural constraints, and reduced decision-making power (24,25). Despite these challenges, the RTDS approach provided a platform that empowered female students to actively participate, contribute, and internalize disaster preparedness behaviors. This inclusivity is particularly crucial in Indonesian rural settings, where cultural norms may limit girls' public engagement. By simulating leadership and collaboration roles in a safe environment, RTDS can help bridge gender gaps in disaster education.

The implications of this study extend beyond the classroom. Educators should be encouraged to adopt RTDS and similar interactive methodologies as standard practice in disaster education. Traditional didactic methods often fail to translate into long-term behavioral change. In contrast, RTDS fosters a participatory environment that not only improves knowledge retention but also strengthens the social-emotional components of disaster preparedness (26). Policymakers can support these efforts by integrating simulation-based learning into national curricula, allocating resources for

teacher training, and ensuring accessibility across diverse school settings (27).

However, while the RTDS intervention proved effective in this context, questions remain about its broader applicability. This study was limited to flood preparedness in a single school setting. Future research should examine the scalability and adaptability of RTDS to other disaster types such as earthquakes, landslides, or fires, as well as its effectiveness across different age groups and geographic regions, including urban schools and remote rural areas. Such studies would enhance the external validity of the findings and inform more comprehensive disaster education policies. As the intervention was designed and evaluated within a highly specific demographic junior high school students in a rural subdistrict vulnerable to flooding, its transferability to other populations or disaster contexts may be limited. Cultural, geographical, infrastructural, and curricular differences may influence how well RTDS can be adapted or accepted elsewhere. Therefore, while the model is promising, future implementations must consider contextual tailoring to ensure effectiveness in different educational environments.

Several methodological limitations should be acknowledged. The absence of a control group in this single-arm design makes it difficult to attribute changes exclusively to the RTDS intervention. Additionally, without a follow-up test, we cannot assess whether the observed changes in attitude are sustained over time. The immediate post-intervention measurement also raises the possibility of short-term enthusiasm or novelty bias influencing responses. These limitations suggest the need for more robust designs, such as randomized controlled trials or longitudinal studies, to further validate the effectiveness of RTDS.

CONCLUSION

The RTDS model significantly improved flood preparedness attitudes among junior high school students in Banyuwangi, particularly in cognitive awareness, affective empathy, and behavioral responsibility. By grounding education in active, participatory learning, RTDS not only conveys knowledge but also cultivates resilience, critical thinking, and a culture of preparedness. The study highlights the promise of RTDS as a disaster education strategy in schools, particularly for enhancing students' attitudes toward flood preparedness. Although results are positive, they should be interpreted with caution due to methodological constraints. RTDS may serve as a valuable component in broader disaster education frameworks, but further evaluation is needed to establish its general effectiveness and scalability.

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Author Contributions

RDP: Conceptualization, data collection, methodology, drafting of the manuscript, critical revision, final approval.

R: Data collection, analysis, drafting, revision.

FAR: Data collection, analysis, interpretation, revision.

AR: Data collection, analysis, interpretation, revision.

AFDR: Data collection, critical revision.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to privacy and ethical considerations involving student participants, the raw data are not publicly available.

Conflict of Interest

The authors confirm that there are no conflicts of interest associated with this study.

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