Original Research

The Effect of Role-Play and Audio-Visual Interventions Based on Local Wisdom in Enhancing Disaster Preparedness Behavior among Elementary Schoolchildren

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Article Info

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<td>Article history:</td>
<td>Introduction: Disaster-prone regions like Karangasem Regency, located in the Ring of Fire, are susceptible to earthquakes and volcanic eruptions. The objective of this study was to evaluate the efficacy of role-playing and audio-visual educational interventions based on local wisdom in improving disaster preparedness behavior among elementary school students.</td>
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<td>Received: 29 August 2023</td>
<td>Methods: This study employed a quasi-experimental design using a pre-test and post-test approach, including a control group. The study participants consisted of elementary school students in grades 4, 5, and 6 who were willing to participate and physically fit. A total of 56 students were included in the study, selected through simple random sampling, with 28 students assigned to each of the intervention and control groups. The research was conducted at Ban 6 Public Elementary School, Kubu, Karangasem, Bali.</td>
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<td>Accepted: 29 October 2023</td>
<td>Results: The utilization of audio-visual educational videos and locally rooted role-playing activities significantly enhanced disaster preparedness behavior among elementary school students at Ban 6 Public Elementary School. This effectiveness was demonstrated by the p-values, which were 0.001, 0.002, and 0.001 for knowledge, attitude, and behavior, respectively, indicating a substantial positive impact of the intervention on all three aspects.</td>
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<td>Keywords: audio-visual, disaster preparedness, local wisdom, role play, schoolchildren</td>
<td>Conclusion: The audio-visual educational videos and locally rooted role-playing activities have proven to be effective in enhancing the elements of knowledge, attitude, and behavior among elementary school students. It is our hope that this method can be consistently applied as an ongoing intervention to further improve disaster preparedness among students.</td>
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INTRODUCTION

Nearly all the provinces of Indonesia are disaster-prone areas [1]. Bali Province is no exception, facing the constant threat of earthquakes and volcanic eruptions [2]. This vulnerability stems from Bali’s location within the Pacific Ring of Fire, making it highly susceptible to volcanic eruptions [3]. Notably, Mount Agung, one of Bali’s active volcanoes, exhibited heightened volcanic activity in 2017 [2][3]. According to data from the Regional Disaster Management Agency (BPBD) of Karangasem Regency, a significant portion of the residents chose not to evacuate to shelters, instead opting to continue their daily routines in disaster-prone areas despite the escalating volcanic activity [1]. While this did not lead to casualties, it had repercussions across various sectors, including education [4].

The education sector severely impacted by the activities of Mount Agung includes schools situated within an 8-kilometer radius of the mountain, placing them in a high-risk zone [5]. This situation underscores the potential threat posed by volcanic eruptions to these schools [6]. Furthermore, the physical characteristics of these school buildings, which are situated near hills, amplify the potential impact of disasters, particularly in the event of a volcanic earthquake [7]. Most of the schools located in the danger zone of Mount Agung are primary schools. Consequently, an analysis of this situation reveals that children represent the most vulnerable demographic affected by disasters within the school context [8][9]. On the flip side, it is important to note that schools can function as a community capable of fostering a culture of disaster preparedness, playing a strategic role in building disaster resilience, particularly among students [10][11]. Students serve as key conduits for disseminating essential information to the community and serve as valuable sources of knowledge for enhancing preparedness, especially concerning school safety and disaster education [12].

Information from the National Disaster Management Agency (BNPB) indicates that 75% of schools in Indonesia are situated in regions prone to disasters [13]. Drawing on the eruption of Mount Merapi in 2018, it was reported that this event resulted in 2 fatalities and significant damage to 5 school buildings. Additionally, records of climate change-related incidents reveal that approximately 175 million children annually experience the effects of disasters [14]. Previous research data highlights a concerning lack of disaster knowledge among students, particularly those at Pilangede Elementary school in Bojonegoro Regency [15]. This deficiency in knowledge among elementary school children is evident in their limited understanding of the causes and occurrence of disasters [16]. Moreover, this limited awareness corresponds with suboptimal attitudes and behaviors, as evidenced by children continuing to engage in activities within disaster-prone areas [17]. In contrast, students at Cepokosawit 2 Public Elementary School exhibit a higher level of knowledge, along with positive attitudes and behaviors related to disaster preparedness [18]. However, initial study findings in Ban Village suggest that elementary school children there
lack awareness about the potential impact of a Mount Agung eruption, safe play areas, and appropriate actions to take when the mountain is on alert.

In accordance with The Sendai Framework for Disaster Risk Reduction 2015-2030, it is imperative to emphasize the security and safety of schools in the face of potential disasters [19]. Disaster Risk Reduction (DRR) comprises three key pillars: ensuring secure learning environments, effective school disaster management, and delivering disaster resilience education [20][21]. Proactive disaster risk reduction is exemplified by students’ readiness, encompassing their knowledge, attitudes, and actions [22]. Consequently, enhancing student preparedness represents a critical endeavor aimed at mitigating disaster risks, particularly within disaster management efforts [23]. To establish a disaster-prepared environment, it is essential to implement active, cost-effective, and community-driven interventions that prioritize local expertise and insights [24].

Education and training for disaster preparedness should be tailored to specific needs and designed for long-term sustainability [25][26]. As noted by Rustam, Mutthalib, and Rahman (2022), the use of educational videos can have a significant impact on children’s understanding and attitudes towards disaster management [27]. Utilizing videos as an educational tool can engage children effectively with the material, ensuring that the messages related to disaster preparedness are effectively conveyed [28]. These findings align with data suggesting that the utilization of audio-visual elements and role play in education has a positive influence on the behavior of elementary school children. Both of these methods can effectively illustrate the flow of information, serving as stimuli in the learning process that enhances knowledge, attitudes, and motivation regarding disaster preparedness [29].

In recent years, numerous innovations have emerged to enhance disaster preparedness behavior. These innovations have arisen in response to the recurring losses experienced across various aspects of human life due to the impact of disasters [30][31]. However, it’s worth noting that prior research involving audio-visual education and role-play methods often overlooked the incorporation of local wisdom. Local wisdom-based education is implemented through activities known as "Mesatua Bali" and a role-playing game called "Goak Maling Taluh." Within these disaster education practices, mesatua activities are integrated into classroom learning, employing Balinese storytelling techniques infused with humor to engage students and help them grasp the significance of disaster preparedness narratives. On the other hand, the role-playing game "Goak Maling Taluh" is an enjoyable group activity that fosters cooperation and cohesion while practicing disaster preparedness.

The utilization of local wisdom-based approaches in disaster preparedness innovations empowers researchers to address the demand for effective methods and incorporate them into a strategy aimed at mitigating the impact of potential volcanic eruptions. This approach enables researchers
to reinforce the attributes of disaster preparedness among students. Importantly, local wisdom has the inherent ability to mold individuals' behavior, promoting readiness for various types of disasters [32]. However, it’s crucial to highlight that local wisdom in Ban Village has not yet been fully integrated into academic activities, leading to its perception as a myth and is at risk of fading from the local community’s consciousness. To address this gap, education and training focused on Mount Agung disaster preparedness, rooted in local wisdom, are delivered through audio-visual educational videos and role-playing activities that align with children’s preferences.

The utilization of technology rooted in local wisdom, which will be implemented in this study, is expected to promote the development of disaster-prepared behavior among elementary school students (referred to as SADANA) at Ban 6 Public Elementary School, situated in a location vulnerable to Mount Agung’s potential disasters. In Balinese society, the term SADANA signifies wealth and prosperity, aligning with the researchers' objective of safeguarding children through the cultivation of disaster preparedness behaviors, thereby safeguarding their parents' assets as well.

According to information provided by the Head of the Karangasem District Education Office, the elementary school children in Ban Village have never had access to counseling or training related to disaster preparedness due to various constraints. This situation serves as the primary motivation for researchers to provide disaster knowledge to children from an early age. Therefore, the aim of this study was to assess the effectiveness of role-play and audio-visual educational interventions in enhancing disaster preparedness behavior among elementary school students.

**METHODS**

**Study Design**

This study employed a quasi-experimental design that incorporated a pre-test and post-test methodology, including a control group.

**Place and Participants**

The research was conducted at Ban 6 Public Elementary School in Kubu, Karangasem, Bali. The inclusion criteria for selecting participants in this study included elementary school children in grades 4, 5, and 6 who were willing to participate as respondents and were in good physical health. The sample size for this study consisted of 56 individuals, selected through a simple random sampling method, with 28 participants assigned to the intervention group and 28 participants assigned to the control group.

**Instrument and Data Collection**

In this study, the instruments utilized included questionnaires assessing knowledge, attitudes, and behaviors related to disaster preparedness to gauge the participants' disaster preparedness behavior. The researchers were involved in seeking permission for data collection, which was sought from the Head of the Karangasem District Education Office, the Kubu II Health
Center, and the Head of Ban Village. Prior to participating in the study, the researchers will ensure that respondents are willing to take part by obtaining their signatures on an informed consent form.

The intervention group was provided with a blend of audio-visual educational videos and locally rooted role-playing activities, whereas the control group solely received audio-visual educational videos. The research took place over the course of one month, during which participants engaged in one-hour sessions of audio-visual educational videos and role-plays twice a week. The progress of the participants was evaluated on a weekly basis, with the assessment spanning a total of four weeks.

**Data Analysis and Ethical Approval**

The data analysis for this study involved both univariate and bivariate analyses. Univariate analysis was employed to describe the characteristics of the respondents, providing a detailed overview of their individual attributes. In contrast, bivariate analysis was utilized to examine the relationship between two variables.

Before conducting the bivariate analysis, a normality test was performed using the Kolmogorov-Smirnov test at a significance level of 5%. Subsequently, the Paired Samples T-test was employed to compare the average levels of knowledge, attitudes, and actions before and after the intervention within the same group. Meanwhile, the Independent Samples T-test was used to determine whether there were significant differences in the average levels of knowledge, attitudes, and actions before and after the intervention among different groups. Ethical approval for the research was obtained from ITEKES Bali under Reference Number 04.0387/KEPITEKES-BALI/VIII/2023.

**RESULTS**

The research took place at Ban 6 Public Elementary School 6, located in the Kubu District of Karangasem Regency, and spanned a period of one month, specifically from July 31 to August 25, 2023.

According to the data presented in Table 1, the characteristics of the respondents revealed that the majority of respondents in both groups were male. In the intervention group, there were 16 males (57.1%) and 12 females (42.8%), while in the control group, there were 15 males (53.5%) and 13 females (46.4%). Furthermore, the age range of the research respondents fell within the 10-12 years bracket.

Based on the findings presented in Table 2, the analysis revealed that prior to receiving the combined intervention of audio-visual educational videos and locally rooted role-plays, the average knowledge score was 42.46. Following the intervention, the average knowledge score increased to 46.18. These results were further supported by the outcomes of an independent t-test, which yielded a p-value of 0.001 (p<0.05), signifying a significant difference in knowledge levels before and after the intervention.

Conversely, in the control group, it was observed that the mean knowledge score was 37.35 before receiving the leaflet, but it decreased to 36.64 after receiving the leaflet.
The independent t-test analysis results in this case indicated a p-value of 0.062 (p>0.05), leading to the conclusion that there was no significant difference in knowledge levels before and after distributing the leaflet.

Regarding attitudes, Table 2 illustrates that in the intervention group, the average attitude score was 21.31 before the intervention, and it increased to 24.18 after the intervention. Statistical analysis using an independent t-test yielded a p-value of 0.002 (p<0.05), indicating a significant difference in attitudes before and after the intervention.

On the other hand, the control group exhibited different outcomes. The mean attitude score in the control group was 16.18 before receiving the leaflet, but it decreased slightly to 16.00 after receiving the leaflet. The results of the independent t-test indicated a p-value of 0.582 (p>0.05), suggesting no significant difference in attitudes before and after receiving the leaflet.

In terms of behavior, the analysis demonstrated that the mean behavior score before the intervention involving audio-visual educational videos and locally rooted role-plays was 18.18, and it increased to 22.86 after the intervention. The independent t-test yielded a p-value of 0.001 (p<0.05), indicating a significant difference in behavior before and after the intervention.

Meanwhile, in the control group, the mean behavior score before receiving the leaflet was 17.59, and it increased to 18.55 after receiving the leaflet. The results of the independent t-test indicated a p-value of 0.134 (p>0.05), suggesting no significant difference in behavior before and after receiving the leaflet.

### Table 1
Characteristics of Respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention (n=28)</th>
<th>Control (n=28)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Man</td>
<td>16</td>
<td>57.1</td>
</tr>
<tr>
<td>Woman</td>
<td>12</td>
<td>42.8</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>25.0</td>
</tr>
<tr>
<td>11</td>
<td>8</td>
<td>28.5</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>46.4</td>
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</table>

### Table 2
Effect of Intervention towards Knowledge, Attitudes and Behavior

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Pre Mean</th>
<th>SD</th>
<th>Post Mean</th>
<th>SD</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Knowledge</td>
<td>Intervention</td>
<td>42.46</td>
<td>3.94</td>
<td>46.18</td>
<td>2.58</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>37.35</td>
<td>3.93</td>
<td>36.64</td>
<td>4.95</td>
<td>0.062</td>
</tr>
<tr>
<td>Attitude</td>
<td>Intervention</td>
<td>21.32</td>
<td>2.86</td>
<td>24.18</td>
<td>1.65</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>16.18</td>
<td>4.85</td>
<td>16.00</td>
<td>3.76</td>
<td>0.582</td>
</tr>
<tr>
<td>Behavior</td>
<td>Intervention</td>
<td>18.18</td>
<td>2.18</td>
<td>22.86</td>
<td>1.68</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>17.59</td>
<td>2.46</td>
<td>18.55</td>
<td>2.67</td>
<td>0.134</td>
</tr>
</tbody>
</table>

Note: Independent samples t-test was performed, *Significant at p<0.05.
DISCUSSION

The primary objective of this study was to assess the effectiveness of an intervention involving role-play and audio-visual education in improving disaster preparedness behavior among elementary schoolchildren. The study's findings indicated that the age range of the elementary school students involved in the research varied from 10 to 12 years old. Theoretically, children within this age group typically demonstrate cognitive development ranging from 80% to 92%, enabling them to think logically and engage in more complex reasoning [18]. Furthermore, during this stage of development, children tend to exhibit an increased ability to concentrate on objects and initiate analytical thinking, reducing their reliance on imagination. This concept was distinctly evident among the research respondents. Throughout the study, it was observed that all students were highly attentive, displayed cooperative behavior, and diligently followed all instructions right from the start of the research. Additionally, they actively participated and provided positive responses during the question-and-answer sessions. The children also exhibited a strong focus on the commands given by the researcher, resulting in highly efficient data collection sessions. As a result, it can be concluded that the age range of 10-12 years for elementary school students is highly suitable for disaster preparedness education, given their receptive and engaged demeanor during the study [33][23].

Moreover, the study findings highlight a notable contrast in the average knowledge levels of students in the two groups. In the intervention group, where students received audio-visual educational videos and engaged in role-plays grounded in local wisdom, there was a substantial and significant improvement. Conversely, in the control group, where students were provided with only leaflets, there were no significant changes observed. These outcomes suggest that delivering education through audio-visual videos and interactive role-playing activities can enhance elementary school students' comprehension of the material and improve their ability to concentrate on the subject matter. Consequently, such an approach can also foster greater empathy toward real-life events and situations [34].

Furthermore, the use of audio-visual educational videos and locally rooted role-plays facilitates the enhancement of students' preexisting knowledge, particularly their fundamental understanding. This effectiveness stems from the incorporation of local culture, which is inherently intertwined with their daily lives. Throughout the study, it was apparent that children found it considerably easier to grasp the presented material, particularly in the control group. They expressed that the language used in the educational materials helped them better understand the concepts related to disaster preparedness for Mount Agung eruptions. Conversely, in the leaflet group, younger students encountered some challenges in interpreting the material, indicating that the leaflets might not have been as effective in conveying the information. Therefore, it can be concluded that by integrating the local wisdom of Balinese culture, elementary
school children can more easily enhance their foundational knowledge in disaster preparedness [35].

The domain of attitudes displayed a contrast between the intervention group and the control group. In the intervention group, a significant disparity emerged between attitudes before and after exposure to the audio-visual educational video and locally rooted role-play based on local wisdom. However, in the control group, there was no discernible shift in attitudes before and after receiving the leaflet. These findings align with research conducted by previous research [36], which underscores the effectiveness of educational media employing audio-visual videos incorporating "Mesatua Bali" and role-play activities involving the game "Goak Maling Taluh." These materials are deeply rooted in local wisdom and are meticulously designed to present content related to disaster preparedness in a structured manner. They utilize harmonious visuals and sounds that resonate with the cultural context, rendering disaster preparedness concepts readily comprehensible to elementary school children [37].

Moreover, educational materials incorporating local wisdom are highly pertinent to the characteristics of elementary school children residing in disaster-prone areas, particularly in Disaster Prone Areas I (KRB I) like Daye Village. Conversely, the attitude data in the control group of elementary school children displayed no significant differences before and after receiving the leaflets. This outcome can be attributed to several factors, primarily that children may not possess the full capacity to comprehend disaster preparedness materials conveyed through leaflets. Consequently, their knowledge may remain insufficient, leading to a lack of positive reception and acceptance of attitudes toward disaster preparedness. In conclusion, the provision of audio-visual educational media and role-play activities can effectively enhance disaster preparedness.

Within the behavioral domain, significant differences were observed in the intervention group, with a notable mean difference observed before and after the intervention. This outcome is likely due to the utilization of educational media in the form of audio-visual educational videos like "Mesatua Bali" and role-playing activities in the game "Goak Maling Taluh," which are highly accessible and comprehensible for students. When students engage with audio-visual educational videos presented in a simple language that they can easily understand, they are more likely to apply the knowledge effectively. This is further reflected in their behavior during disaster role-play exercises, which are designed as enjoyable games. These findings align with prior research [38], which emphasizes that individuals, especially elementary school children, who possess a better level of knowledge, are more inclined to modify their behavior concerning disaster preparedness. The content within the videos and the meaningful inclusion of traditional games as part of the role-play experience effectively cater to the needs and context of elementary school children in the local village.

The findings of this study are corroborated by previous research [32][39], which affirms that behavior change is more
likely to occur when it is rooted in knowledge compared to situations where knowledge is lacking. Elementary school children who exhibit positive tendencies toward disaster preparedness typically do so because they have received comprehensive knowledge, which aligns with positive attitudes and can consequently be translated into positive behaviors. This solid knowledge foundation is achieved through appropriate methods of information delivery that cater to local cultural characteristics and address the specific needs of disaster analysis.

By incorporating local wisdom as the cornerstone of the local community’s way of life, the acceptance of disaster preparedness concepts becomes more effective among elementary school children. This stands in contrast to merely using leaflets, which may not be as easily digestible for elementary school children [40]. Integrating local wisdom, which is deeply rooted in the community’s way of life, will lead to a more effective understanding and acceptance of information among elementary school children. Additionally, the use of methods that are more child-friendly than simply relying on leaflets which may not be easily comprehensible for elementary school children.

LIMITATION

The researcher acknowledges that one limitation of the study is related to the data collection frequency. Ideally, data collection should occur twice a week; however, due to factors such as the Galungan and semester holidays, data could only be collected once a week during certain periods.

CONCLUSION AND RECOMMENDATION

The audio-visual educational videos and role-playing activities grounded in local wisdom had a significant impact on improving the knowledge, attitudes, and behaviors related to disaster preparedness among the students at Ban 6 Public Elementary School. These methods were proven to enhance all three aspects and are highly recommended for continued use. It’s crucial to emphasize that disaster-prone areas require instilling awareness of disaster preparedness from a young age, highlighting the importance of early education in this regard.

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CONFLICT OF INTERESTS

All of the authors of this manuscript have no conflict of interest to declare.

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