NURSING INFORMATION JOURNAL
Page 152-159

NURSING INFORMATION JOURNAL
Volume: 5, Issue: 1, 2025
Original Research Article
e-ISSN 2809-0152
DOI https://doi.org/10.54832/nij.v5i1.1258

THE EFFECTIVENESS OF THE VIRTUAL INTERACTIVE MEDIA INARISK PERSONAL ON FLOOD DISASTER PREPAREDNESS AMONG ADOLESCENTS

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ABSTRACT
Floods are among the most frequent natural disasters in Indonesia and have a substantial negative impact on communities, particularly vulnerable groups such as children and adolescents. The consequences of flooding include not only material losses but also disruptions to social, educational, and health activities. Adolescents, as part of a critical developmental stage, require appropriate disaster education to increase their awareness and preparedness in facing such events. This study aims to examine the effectiveness of InaRISK Personal, an interactive virtual media developed by the Indonesian government, in improving flood disaster preparedness among adolescents. This research employed a pre-experimental design with a one-group pretest-posttest approach. The study was conducted at SMP Negeri 1 Kalipuro, Banyuwangi, a flood-prone area in East Java. The sample consisted of 85 students, selected through simple random sampling. Data were collected using a 30-item disaster preparedness questionnaire, which had previously undergone validity and reliability testing. The data were analyzed using the Wilcoxon signed-rank test. The results revealed a significant difference between pretest and posttest scores, with a p-value of 0.000 ($p < 0.05$), indicating that the use of InaRISK Personal significantly improved students' disaster preparedness levels. The study also observed a shift in preparedness categories, with most students moving from "almost prepared" to "prepared" or "very prepared" after the intervention. this study highlights the practical potential of InaRISK Personal as a digital tool to support school-based disaster education. While digital platforms in disaster preparedness are not entirely new, the application of InaRISK Personal among adolescents in formal education settings—particularly in disaster-prone regions—adds context-specific insights that support its wider adoption.

Keywords: InaRISK; Preparedness; Disaster; Flood; Adolescents

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Article History:
Received: 23 April 2025
Revised: 29 June 2025
Accepted: 04 July 2025

INTRODUCTION

Indonesia is a country highly prone to natural disasters, with floods being among the most frequent and impactful. According to the National Disaster Management Agency (BNPB), floods have accounted for over 40% of all reported disaster events in the country over the past five years (Paramita Mustari 2022). Floods not only cause material losses but also

disrupt social, educational, and health activities, particularly among vulnerable groups such as children and adolescents (Echendu, 2020).

The widespread and recurring impacts of floods highlight the importance of improving community preparedness, especially among adolescents. Adolescents are in a critical developmental transition phase that shapes their character and behavior, and they have great potential as agents of change in society (Ariningtyas, 2020; Rudiyanto et al., 2023). However, disaster preparedness levels within this age group remain relatively low. Limited knowledge, lack of emergency response skills, and restricted access to disaster-related information tailored to their age characteristics are major obstacles to achieving optimal preparedness (Mariam et al. 2021).

Conventional disaster education has not been fully effective in capturing the interest and attention of adolescents. Therefore, a more innovative and adaptive approach is needed to keep up with the times. The advancement of information technology offers great opportunities to develop more interactive and engaging learning media for adolescents (Haristiani et al., 2023; Tsai et al., 2020). One such innovation developed by the Indonesian government through BNPB is a digital disaster education tool known as InaRISK Personal. This application provides spatial information on disaster risks and is equipped with educational features such as mitigation guidelines, educational videos, and interactive simulations (Sudrajad, Napitupulu, and Rhofiq 2023).

The use of InaRISK Personal as a disaster education medium is expected to enhance adolescents' understanding and preparedness in facing disasters, particularly floods. Previous studies have shown that digital media is highly effective in delivering information to younger age groups, as it leverages visualization, interactivity, and the ease of access offered by modern technology (Febrianto, Purwanto, and Irawan 2021). Unlike previous school-based disaster education methods that rely heavily on lectures or printed modules, this intervention integrates real-time geospatial risk information and digital interaction, offering a more context-aware and engaging learning experience.

One of the areas in Indonesia that is frequently affected by floods is Kalipuro District, Banyuwangi Regency. According to data from the Regional Disaster Management Agency (BPBD), this area has a high vulnerability to seasonal floods that often impact residential areas and public facilities, including schools. SMP Negeri 1 Kalipuro, as one of the educational institutions located in this region, is a relevant site for implementing technology-based disaster education. A preliminary study conducted at this school revealed that most students have not yet understood the essential steps in responding to floods, either individually or collectively. (Putriani et al. 2023). Based on this background, this study aims to examine the effectiveness of the virtual interactive media InaRISK Personal in improving adolescents' preparedness for flood disasters. This research is expected to contribute to the development of more effective and practical disaster education strategies, particularly at the secondary education level.

METHODS

Study Design

This study is a pre-experimental research using a one-group pretest-posttest design. This design involves a single group that is measured before and after the intervention to determine the difference in scores.

Setting

This study was conducted at SMP Negeri 1 Kalipuro, Banyuwangi, and was carried out from February to April 2024.

Research Subject
The population consisted of all students at SMPN 1 Kalipuro, totaling 529 students. A sample of 85 students was selected using the simple random sampling method. The inclusion criteria were students who were willing to participate in the study and were present during the data collection process. The exclusion criteria included students who were uncooperative or ill.

Instruments
The flood disaster preparedness questionnaire consisted of 30 items, which had been tested for validity and reliability. The indicators measured included knowledge, emergency planning, warning systems, and resource mobilization. Responses were scored using a Likert scale, with interpretation based on an index (Alami, Widyananto, and Alfarizi 2024). The questionnaire underwent prior testing to ensure its quality: validity was confirmed through item-total correlation values ($r > 0.3$), and reliability testing showed a Cronbach's alpha coefficient of 0.86, indicating high internal consistency.

Intervention
The intervention consisted of education using the InaRISK Personal application for 60 minutes. The questionnaire was completed before and after the intervention (pretest and posttest).

Data Analysis
Data analysis in this study was conducted in two stages: univariate and bivariate analysis. Univariate analysis used frequency distribution to determine the level of preparedness before and after the intervention, while bivariate analysis used the Wilcoxon signed-rank test through SPSS 21.0 to examine the differences in scores before and after the intervention.

Ethical Consideration
This study received ethical approval from the Health Research Ethics Committee of STIKES Banyuwangi with approval number 171/01/KEPK-STIKESBWI/V/2024. Participation was voluntary, and informed consent was obtained and agreed upon by all participants.

RESULTS

Table 1. Characteristic of the respondents (n=85)

Variables	Intervention	
	n	%
Age		
13	43	50,6%
14	21	24,7%
15	21	24,7%
Gender		
Laki-laki	24	28,2%
Perempuan	61	71,8%

The respondents in this study consisted of 85 students from SMPN 1 Kalipuro, comprising 43 male students (50.6%) and 42 female students (49.4%), with an age range of 12 to 15 years.

Tabel 2. The Level of Flood Disaster Preparedness Among Respondents Before Intervention

Pre-Intervention Preparedness	N	Percentage (%)
Very prepared	66	77,6%
Prepared	19	22,4%
Total	85	100%

The pretest results showed that 77.6% of students were in the "very prepared" category and 22.4% were in the "prepared" category.

Tabel 3. The Level of Flood Disaster Preparedness Among Respondents After Intervention

Post-Intervention Preparedness	N	Percentage (%)
Very prepared	85	100%
Total	85	100%

After the intervention using the interactive media InaRISK Personal, there was a significant improvement in the preparedness category. The posttest results showed that 100% of students were in the "very prepared" category.

Tabel 4. Comparison of Flood Disaster Preparedness Among Adolescents Before and After the Use of InaRISK Personal Interactive Media

Variable		Category				median	p-value
		Very Unprepared (%)	Unprepared (%)	Prepared (%)	Very Prepared (%)		
Flood Disaster Preparedness Among Adolescents	Pre-Test	0	0	19 (22,4%)	66 (77,6%)	4	0.000
	Post-Test	0	0	0	85 (100%)	4	

Data analysis using the Wilcoxon signed-rank test showed a significant difference between pretest and posttest preparedness scores, with a p-value of 0.000 ($p < 0.05$). This indicates that the InaRISK Personal interactive media is effective in improving flood disaster preparedness among adolescents.

DISCUSSION

The results of this study demonstrate that the use of the InaRISK Personal virtual interactive media significantly improved flood disaster preparedness among adolescents, as evidenced by the Wilcoxon signed-rank test ($p = 0.000$, $p < 0.05$). This finding suggests that even a short-term intervention, when delivered through a well-designed digital platform, can effectively influence students' cognitive and affective readiness toward disaster events.

This is in line with prior studies which emphasized that technology-based learning tools can enhance disaster education outcomes (Anggaryani et al., 2023). For instance, Febrianto, Purwanto, and Irawan (2021) highlighted that interactive educational media, when customized to the needs and preferences of adolescents, has the potential to foster greater engagement and retention of knowledge. InaRISK Personal, through its features such as geolocation-based risk mapping, interactive simulations, and visual learning resources, not only conveys information but also creates an immersive learning experience (Lomban & Ariyani, 2023; Sudrajad et al., 2023). These features make the abstract concept of disaster risk more tangible and personally relevant to students, especially in flood-prone areas.

The shift in preparedness levels—moving from "almost prepared" to "prepared" and "very prepared"—observed in this study signifies a meaningful improvement in students' awareness and attitudes. This change, achieved through a single 60-minute intervention, suggests that adolescents are highly receptive to digital learning tools when the content is interactive, accessible, and contextually tailored. Several previous studies support these findings, including the 3E learning model (Experiential–Exploratory–Engagement) has proven effective in enhancing disaster awareness through participatory and experiential digital

content (Arıkan et al., 2024). In Indonesia, the implementation of the WEB SAINSTREN platform significantly improved disaster preparedness among pesantren students (Hidayah et al., 2025). A randomized controlled trial among nursing students in Turkey also confirmed that structured digital education—incorporating apps, simulations, and interactive tasks—significantly improves disaster literacy and preparedness beliefs (Genç et al., 2025). These findings align with broader evidence in adolescent health literacy, where digital simulations and role-playing strategies have been shown to enhance knowledge retention and positively shift attitudes (Mancone et al., 2024). Collectively, these insights reinforce the value of integrating digital, interactive methods into formal disaster education to foster greater preparedness among youth.

Moreover, adolescents represent a crucial demographic in disaster risk reduction (DRR) efforts. Their ability to absorb information quickly, combined with their influence within peer groups and families, positions them as effective messengers and potential leaders in community preparedness (Cox et al., 2019; Gupta et al., 2019; Pickering et al., 2022). Equipping them with practical knowledge and risk awareness through accessible media, such as InaRISK Personal, strengthens the foundation of community resilience from the ground up.

This study supports the use of virtual interactive media, such as InaRISK Personal, to improve disaster preparedness among adolescents. In disaster-prone areas like Kalipuro District, integrating such tools into school curricula can enhance awareness, reduce risks, and promote resilience. However, successful implementation requires addressing digital access and literacy. The tool's effectiveness may vary depending on students' familiarity with technology and internet availability.

Despite the promising outcomes, this study has several limitations. The use of a one-group pretest-posttest design without a control group restricts the ability to draw causal conclusions, as observed improvements may have been influenced by unmeasured external variables. Additionally, the short duration of the intervention did not allow for an assessment of long-term knowledge retention or behavioral responses in actual disaster situations. Future research is recommended to employ quasi-experimental or randomized controlled trial designs with follow-up evaluations to assess sustained impact over time.

CONCLUSION

This study concludes that the use of the virtual interactive media InaRISK Personal significantly improves adolescents' preparedness for flood disasters. This media effectively bridges the gap in adolescents' knowledge and attitudes toward preparedness in an engaging and accessible way. Technology-based educational approaches have proven effective in delivering disaster-related information to younger age groups. The significant difference in pretest and posttest scores indicates that the InaRISK Personal intervention successfully enhanced students' understanding and preparedness for flood risks in their environment. Therefore, InaRISK Personal can be considered an alternative disaster education medium in schools, especially those located in disaster-prone areas.

SUGGESTIONS

Based on the findings and limitations of this study, it is recommended that schools located in disaster-prone areas integrate the InaRISK Personal application into their disaster education programs to improve students' preparedness. This effort should be supported by the Department of Education by incorporating technology-based disaster education into the national curriculum. Furthermore, the National Disaster Management Agency (BNPB) and local governments are encouraged to expand training and outreach programs that promote the use of InaRISK Personal among students and teachers. To strengthen the impact of disaster education, the involvement of families and local communities is also essential in reinforcing preparedness behaviors at home and building a culture of resilience. Future

research is advised to employ stronger methodological approaches, such as quasi-experimental or randomized controlled trials, and to conduct follow-up assessments to evaluate the long-term effectiveness of the intervention. In addition, the application of InaRISK Personal should be explored across different educational levels and geographic areas to assess its broader relevance and potential for nationwide adoption.

ACKNOWLEDGMENT
The author would like to express sincere gratitude to STIKES Banyuwangi for the moral support and facilities provided throughout the research process. Special thanks are also extended to the Principal and all parties at SMPN 1 Kalipuro for granting permission, assistance, and cooperation during the implementation of this research.

DECLARATION OF INTEREST
The author declares that there is no conflict of interest in the conduct and reporting of this study.

FUNDING
This study did not receive any funding from external parties and was fully self-funded by the author.

AUTHOR CONTRIBUTION
All authors have sufficiently contributed to all research stages. Furthermore, the authors have more opportunities to discuss the entire research process with the research team and assistants. As a result, this study has obtained more diverse considerations to produce research data that is more valid and concrete.

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