

AKSINA Education with Crossword Puzzle on Knowledge of Earthquake Disaster Preparedness in Elementary School Students

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ABSTRACT

Based on data from the *Badan Nasional Penanggulangan Bencana* (BNPB) in 2016, out of the 2000 biggest disasters including earthquakes that occurred in Indonesia, the most victims were children. Disaster preparedness education can be carried out early on in schools so that children know how to avoid and save themselves from disasters. This study aims to determine the effect of education "AKSINA" with crosswords on knowledge of earthquake preparedness disaster in elementary school students. The data collection method uses an earthquake disaster preparedness questionnaire sheet. All data were normally distributed and analyzed using paired t-test statistics. There is a significant effect of providing education "AKSINA" with crosswords puzzle as media on earthquake preparedness for students in grades IV and V with a p-value = $0.000 < \alpha (0.05)$. The results of this study indicate that education with crossword puzzle games has proven effective in increasing students' preparedness knowledge for earthquake disasters. This research is expected to be a reference in providing disaster preparedness education with various game media to increase student knowledge.

Keywords: earthquakes; preparedness; AKSINA education; crosswords

INTRODUCTION

The territory of Indonesia is traversed by 3 three tectonic plates, namely the Eurasian Plate, the Indo-Australian Plate and the Pacific Plate. In addition to having abundant reserves of mineral resources, this condition also causes Indonesia to become a country that is more vulnerable to natural disasters compared to other countries. According to data from the United States Geological Survey (USGS), Indonesia ranks third with the deadliest earthquake with a magnitude of 9.3 accompanied by a tsunami reaching 35 meters in 2004 in Aceh, killing approximately 160,000 people (Pratiwi, 2021). In 2022 there was also an earthquake in Cianjur, East Java, Indonesia with a magnitude of 5.6 and the BMKG recorded 140 aftershocks with magnitudes 1.2-4.2. This earthquake caused 268 fatalities and more than 2,000 houses were damaged (Kementerian Energi dan Sumber Daya Mineral - Badan Geologi, 2022). In 1917, a devastating earthquake, known as Gejer Bali, with a magnitude of 6.6 on the Richter scale rocked the entire mainland of Bali and caused as many as 1,500 deaths (Badan Meteorologi Klimatologi dan Geofisika, 2017). Based on the Indonesian Disaster Information Data (DIBI), there has been an increase in earthquake occurrences from 28 incidents in 2020 to 63 incidents in 2021. Earthquakes are the fourth natural disaster with the most occurrences throughout 2021 after floods, landslides and tornadoes (Badan Nasional Penanggulangan Bencana, 2021). Based on BNPB records, in 2016 of the 2000 biggest disasters that occurred in Indonesia the most victims were children (Humsona et al., 2019).

Children's vulnerability to disasters results from limited understanding of disaster preparedness (Indriasari, 2018). Data in 2022 due to the Cianjur Indonesia earthquake, 100 children under the age of 15 died and 167 students were injured, this makes children a priority in disaster management (Siregar & Wibowo, 2019). Based on these data, there are many victims of school-age children both during school hours and outside of school. This shows the importance of disaster education as an effort to reduce disaster risk from an early age (Indriasari, 2018).

The results of the previous study showed that prior to being given education on preparedness, more than half of students (74.8%) still had low knowledge and after being given education, 68.3% of respondents had high knowledge about disaster preparedness (Simandalahi et al., 2019). This incident shows the importance of disaster education to increase students' preparedness in dealing with and saving themselves from disasters. Disaster preparedness education can be carried out early on in schools so that children know how to avoid and save themselves from disasters. Through

education and disaster preparedness, it can be a very important vehicle for creating a culture of preparedness in dealing with disasters (Nurwin et al., 2015). Cognitive development in students 7-11 years old is at the piaget stage or concrete operational stage, at this stage students will think concretely about a real object, so that educational media is needed to increase student knowledge (Marinda, 2020). Crossword puzzles are an interesting learning media that can refresh memory, so brain function returns to optimality (Rosita, 2021). This educational game is named AKSINA which stands for Disaster Alert Children. The results of the study showed a difference in the average score before being given education, which is 17.05 and the average value after being given education with educational puzzle game games, which is 18.65 (Putri & Suparti, 2020). Other studies have shown an increase in student knowledge from 31% of students with low knowledge to 0% after being given education with educational games (Elita et al., 2019). This shows that educational games can be used as learning media in improving elementary school students' disaster preparedness. This study aimed to determine the effect of providing AKSINA education with crossword media on earthquake disaster preparedness knowledge in elementary school students.

METHOD

This study used a research design, namely a pre-experimental design with a one-group pre-post design. This research was conducted at SD N 5 Tulikup, Gianyar Regency, Bali Province with the consideration that the research location had never received disaster preparedness lessons and was located in a disaster-prone area. This research was carried out in April 2023, the frequency of meetings was 1 time. The population in this study were all students of grades IV and V of SD N 5 Tulikup with a total population of 46 respondents. Inclusion and exclusion criteria were determined in this study. Inclusion criteria included students who were willing to become respondents by signing an informed consent, students who attended the meetings, students who could read and write students in grades IV and V of SD N 5 Tulikup in 2023. The exclusion criteria from this study used drop out criteria, namely students who were not present at the meeting.

Based on calculations, this study requires 38 respondents as a sample. Sampling in this study used the probability sampling method with simple random sampling technique. In this study, questionnaires were used to measure knowledge of earthquake preparedness in grades IV and V using parameters based on the 2006 LIPI-UNESCO/ISDR study. The normality test in this study uses the test skewness by fulfilling the test scale, namely $(-2 < x < 2)$. Because the value of preparedness knowledge before and after being given education with crossword puzzle games is normally distributed so that hypothesis testing can be carried out using parametric statistical tests, namely the paired t-test at a significant level of 5% ($\alpha = 0.05$).

RESULT

Table 1. Characteristics of Respondents Based on Gender and Age

	Characteristics	Frequency (n)	Percentage (%)
Gender	Male	23	54.8
	Female	19	45.2
	Total	42	100.0
Age	10 years	27	64.3
	11 years	15	35.6
	Total	42	100.0

Table 1 shows the characteristics of the respondents from 42 respondents, it was found that the characteristics of the respondents according to age with the majority being 10 years old were 27 people (64.3%). The majority of respondents were male, namely 23 respondents (54.8%).

Table 2. Distribution of Pre-Test Knowledge of Earthquake Preparedness Knowledge before to Providing AKSINA Education with Crossword Puzzle Games for Grade IV and V Students

Variable	N	Mean	Minimum-Maximum	Std Deviation	95% CI
Preparedness knowledge (pretest)	42	13.52	11 -16	1.627	13.02-14.03

Table 2 shows that of the 42 respondents, the average value of students' preparedness knowledge in dealing with earthquake disasters before being given AKSINA education with crosswords, is 13.52 (95% CI: 13.02-14.03), with a standard deviation of 1.627. The highest preparedness knowledge score is 16 and the lowest score is 11. The value of students' knowledge before to being given AKSINA education with crossword media was mostly with a score of 13, namely 9 people (21.4%).

Table 3. Distribution of Post-Test Knowledge of Earthquake Preparedness Knowledge after to Providing AKSINA Education with Crossword Puzzle Games for Grade IV and V Students

Variable	N	Mean	Minimum-Maximum	Std Deviation	95% CI
Preparedness knowledge (posttest)	42	18.00	16-20	1.269	17.60-18.40

Table 3 shows that of the 42 respondents, the average value of students' preparedness knowledge in dealing with earthquake disasters after being given AKSINA education with crosswords, is 18.00 (95% CI: 17,60-18,40), with a standard deviation of 1,269. The highest preparedness knowledge score is 20 and the lowest score is 16. The value of students' knowledge after to being given AKSINA education with crossword media was mostly with a score of 18, namely 12 people (28.6%).

Table 4. Results of Analysis of the Impact of Providing Education "AKSINA" with Media Crosswords Knowledge of Earthquake Preparedness in Class IV and V Students at SDN 5 Tulikup in 2023

Variable	Pretest	Posttest	Mean difference	95% CI		t	p
				Lower	Upper		
Preparedness knowledge	13.52	18.00	-4.476	-5.045	-3.908	-15.900	0.000

Table 4 shows the average preparedness knowledge of students before being given treatment of 13.52 with a standard deviation of 1.627. The average knowledge of students' preparedness after being given treatment was 18.00 with a standard deviation of 1.269. The difference in the average knowledge of students' preparedness in dealing with disasters between before and after being given treatment is 4.476. The Paired t-test statistical test showed that there was a significant effect of providing education with crossword puzzles on knowledge of disaster preparedness in grades IV and V at SDN 5 Tulikup with a p-value of 0.000 (p-value <0.05).

DISCUSSION

The results showed that of the 42 respondents with an average score of students' knowledge of disaster preparedness before to being given AKSINA education with crossword puzzles, is was 13.52. These results show that students' knowledge is in the sufficient category and at the first knowledge level, namely knowing where students only know and mention without understanding and interpreting knowledge indicators properly, namely understanding natural disasters, environmental vulnerabilities, early warning systems and emergency response planning. After the students in grades IV and V were given AKSINA education using crossword puzzles, there was an increase in the average preparedness knowledge score of 18.00. Based on the level of knowledge, the results of this study are at the level of understanding and being able to apply emergency response planning and are included in the category of good knowledge.

Disaster preparedness education can be carried out early on in schools so that children know how to avoid and save themselves from disasters. Given that schools are the basis of the children's community and are a top priority that must be protected while increasing their exposure to disaster knowledge in schools. Knowledge is one of the factors that greatly influence a person's level of preparedness, attitude and concern for being ready and alert in anticipating disasters (Nurwin et al., 2015). The results of the previous research showed that there was an increase in students' knowledge after being given preparedness education of 68.3% of respondents who had high knowledge about disaster preparedness (Simandalahi et al., 2019). This incident shows the importance of disaster education to increase students' preparedness in dealing with and saving themselves from disasters. Through education and disaster preparedness, both formally and informally, it can be a very important vehicle for creating a culture of preparedness in dealing with disasters (Nurwin et al., 2015). From the results of the data, it was found that preparation for increasing preparedness depends on the readiness of school institutions, teachers and students. The school community is an agent of change with great potential to

disseminate knowledge about the earthquake and tsunami phenomena as well as motivate the communities to increase preparedness in order to reduce disaster risk. However, there are still many school communities that are not prepared to anticipate earthquake and tsunami disasters, so education is needed to prepare school communities, especially those in disaster-prone areas (Bachtiar et al., 2021).

The best teaching and learning process for children is through various learning media that attract children's attention because cognitive development in grades IV and V aged 10 and 11 years is in the stage of concrete operational cognitive development where students are already able to think critically and have the ability to communicate and understand real phenomena. Cognitive development of children aged 7-11 years who are able to solve concrete problems (Marinda, 2020). From the results of the data obtained, the value pre-test and post-test in this study showed a significant difference. The value of students' preparedness knowledge at SDN 5 Tulikup is at a level of knowledge that is already able to understand and interpret properly and correctly after being given AKSINA education. Therefore, by providing education about disaster to students on a regular basis it is believed that it can increase understanding of disaster preparedness. Basically, students already have sufficient knowledge of efforts to deal with disaster phenomena that occur. Providing education which is usually given through lectures and question and answer alone can be replaced by educational game methods.

Educational games are a medium that can be used to provide information to support learning facilities, especially regarding disasters, because the world of children is inseparable from the world of play (Yasbiati & Gandana, 2019). The AKSINA (Disaster Preparedness Children) game which consists of crossword puzzle educational games is one of the interesting and fun learning media that can increase students' motivation to study harder and motivate students to keep looking for the right answers. Crossword games can have a refreshing effect on memory, so that brain function returns to optimality (Amin & Sumendap, 2022). A crossword puzzle is a game that has a rectangular pattern consisting of a number of black and white boxes and is equipped with two lines, namely horizontal (consisting of a group of boxes that form one row and several columns) and descending (a collection of squares, forming one column and several rows). To finish this game, all the white boxes must be filled in with the available words in the existing set of words (Amin & Sumendap, 2022).

The results of the analysis using the paired t-test statistic obtained a p-value, that is 0.000. This shows that the provision of education "AKSINA" with crossword puzzle games has a significant effect on knowledge of earthquake disaster preparedness in grades IV and V. The results of this study are in line with research conducted by Elita et al. (2019) which states that there is an increase in students' disaster knowledge after being given education with the media of crossword puzzles, snakes and ladders, and AKSANA books, through educational games children gain knowledge in a more pleasant atmosphere and by practicing or simulating ways of saving themselves during a disaster it will make more of an impression on the child's long-term memory.

CONCLUSION

It can be concluded that the provision of AKSINA education with the media of crossword puzzle games can have an effect on increasing the preparedness knowledge of class IV and V students in dealing with earthquake disasters. We recommend to further researchers to be able to develop research targets with a larger scale and the sample used consists of the intervention group and the control group in the study.

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