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## Earthquake Readiness Education Using Simulation Method and Picture Book Media in Elementary School Students in Majene Regency

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### ABSTRACT

Children are one of the vulnerable populations affected by natural disasters, due to their inability to act independently in the event of a disaster. So it takes effort to improve the preparedness of children to face natural disasters. The aim of the study was to analyse the impact of education with simulation methods and picture books on the knowledge and attitudes of elementary school students on the preparedness of earthquake disasters. The research method used a quasi-experiment with Non-Randomized Pre-Test Post-Test Control Group Design. Sample count of 70 samples. Sample withdrawal was done by Simple Random Sampling. Data analysis was done using Wilcoxon statistical tests and paired t test. The results showed that the p value for knowledge was 0.000 whereas for the attitudes showed a p value of 0.000. Both show that the p value <0.005 which means that there was an effect on the simulation methods and picture book media on the knowledge and attitudes of elementary school students related to earthquake disaster preparedness. For further researchers, it was advisable to develop action variables to measure the educational influence of students' actions in the preparedness of the earthquake.

**Keyword:** Education, Readiness, Earthquake, Simulation, Picture Book

### INTRODUCTION

Earthquakes are one of the natural disasters that swallow victims quite a lot. According to Şakiroğlu (2005) and Rij (2016) earthquakes are the displacement and

shaking of soils due to seismic waves, usually caused by the rupture of geological faulting when two tectonic plates suddenly move in different conditions that occur suddenly, unpredictable, uncontrolled, and is a short-term natural event with a destructive effect.<sup>[1,2]</sup>

According to Badan Meteorologi, Klimatologi dan Geofisika (BMKG) the earthquake is a natural disaster that often occurs in Indonesia, which is the average of each month recorded 400 times.<sup>[3]</sup> This resulted in approximately 150 million Indonesians affected by the earthquake.<sup>[4,5]</sup> The economic losses caused by earthquakes that occurred since 2004-2010 vary from US \$39 million to US \$4.7 billion and result in more than 200,000 casualties.<sup>[6,7]</sup>

In 2015 the Ministry of Health of the Republic of Indonesia (Kemenkes RI) established 170 disaster-prone districts. From the list one of the disaster prone districts is Majene Regency, West Sulawesi.<sup>[8]</sup> Moreover, according to Badan Nasional Penanggulangan Bencana/BNPB (2013), Majene District also ranks 8 major national disaster risk.<sup>[9]</sup> This is in line with the results of preliminary studies researcher with the head of Badan Penanggulangan Bencana Daerah (BPBD) Majene dist.<sup>[24]</sup>

Enarson et al (2007) states that in many developing countries, children are one of the population that is most vulnerable to natural disasters and in the event of catastrophe most of the victims are children.<sup>[10]</sup> Each year there are about 175

million children tend to be exposed to natural disasters. This is due to their inability to act independently in the event of a disaster due to their dependence on adults.<sup>[11]</sup>

Research conducted by Winarni et al (2018) and Wu et al (2015) states that natural disasters can cause a double burden on children, other than can cause physical injury, they also have trauma.<sup>[12,13]</sup> It is also expressed in research studies conducted by Kousky (2016) that children are more likely to experience greater difficulty in the processing of emotional trauma.<sup>[14]</sup>

Looking at the condition that children are one of the most sensitive groups in society, awareness of disasters should start early in hopes that children have good readiness and independence to respond disaster. In addition education awareness can improve their chances of surviving the disaster if they understand about disasters and can make good decisions when the disaster occurs because when disaster occurs it could be far from Parents or even alone.<sup>[15]</sup>

Research Suryaningsih et al (2017) states that it needs to be designed media that contains material about mitigation and can be used as a supplement in learning to broaden students' knowledge of disaster mitigation.<sup>[16]</sup> The same thing is also conveyed in Nugroho Research (2018) stating that it is necessary for appropriate media to embed disaster mitigation that suits the needs and characteristics of the students.<sup>[17]</sup>

One of the educational media that can be used to convey disaster mitigation messages is picture books. Students at elementary school age tend to be more happy to read if the contents of the book are interesting pictures, even more pleased to read the illustrated storybook.<sup>[18]</sup>

In addition to the use of learning media, it can also be done by involving students directly in the field about what to do in the event of a disaster. According to Olson et al (2010) education on disaster preparedness using simulation in the form of

games can give better results than those who do not use simulations.<sup>[19]</sup>

However, in the field, there are still many schools in the disaster prone areas that do not develop media and innovative learning models about disaster mitigation.<sup>[16]</sup> Similarly in Majene District, the results of interviews with BPBD employees Majene District mentioned that the innovation of learning models is still lacking.

Because there is still lack of research related to the simulation of earthquake disaster conducted in elementary school children as well as lack of picture book media related to earthquake disaster for elementary school children make researchers interested to see the influence of giving simulation and educational with picture books on the knowledge and attitudes of elementary school students in the event of earthquake disaster preparedness in Majene district.

## MATERIALS AND METHODS

### Location and research design

This research was conducted in two elementary schools in Majene District, SDN 26 Pakkola as a group of interventions that were educated by simulation and picture book media and SDN 28 Tamo as a control group that was only given picture book. The research used was a Quasi Experiment with Non-Randomized Pre-Test Post-Test Control Group Design.

### Population and samples

The population in this study was all active students as students of grade IV, V and VI at SDN 26 Pakkola as many as 114 students and SDN 28 Tamo as many as 109 students. So the total population of the samples was 223 students, each school selected as many as 39 students samples.

### Data collection Methods

Primary Data is obtained from selected students as samples with a pre-compiled list of questions (questionnaire) made under the Guidelines of disaster preparedness made by BNPB and the Ministry of National

Education based on Research objectives and is filled by respondents. Data collection has been done three times, namely pre test, post Test 1 and post Test 2. Where each test has a time lapse of 2 weeks.

### Data analysis

The analysis used is univariate analysis and bivariate. Univariate Analysis aims to obtain an overview of the problem of research by looking at the overview of frequency distribution as well as a single percentage related to research objectives. Whereas bivariate analysis to analyse the difference between independent variables and dependent variables, the analyses used were Wilcoxon and Paired Sample T Test.

## RESULTS

The results of the study based on table 1 showed respondents to the intervention group dominated by female gender (28.6%) While males (21.4%) Based on the age of the group is dominated by 10 years old (22.9%) and least is the age of 9 years (2.9%), most respondents came from

class IV which is as many as 13 students (18.6%), the work of parents of most students is self-employed as many as 20 students (28.6%), respondents who have been informed about Earthquake preparedness as much as 33 people (47.1%) Whereas that has never been as many as 2 people (2.9%), and the characteristics based on the preparedness information source in the most widely sourced intervention group of teachers in school (22.9%).

In the control group, the female gender is also the most group (34.3%) While males amounted to 15.7%. Based on age, dominated by 11-year-old students as much as 20%, most students also come from class IV, which is as many as 16 students (22.9%), parents' work is also dominated by self-employed (45.7%), who have been informed about Earthquake preparedness as much as 19 people (27.1%) And that has never been as much as 16 people (22.9%), while the characteristics based on the information source in this group most of the information comes from BMKG namely as much as 18.6%.

Table 1. Distribution group intervention and control groups based on gender, age, class, parental work, information on earthquake preparedness and source of information

Characteristics	Intervention Group		Control Group	
	n	%	n	%
<b>Gender</b>				
Female	20	28.6	24	34.3
Male	15	21.4	11	15.7
<b>Age</b>				
9 years	2	2.9	11	15.7
10 years	16	22.9	5	7.1
11 years	10	14.3	14	20
12 years	7	10	5	7.1
<b>Class</b>				
IV	13	18.6	16	22.9
V	12	17.1	12	17.1
VI	10	14.3	7	10
<b>Parental work</b>				
Civil servant	9	12.9	1	1.4
Honorary officer	4	5.7	1	1.4
Private employee	2	2.9	1	1.4
Entrepreneur	20	28.6	32	45.7
<b>Whether ever get information on earthquake preparedness</b>				
Yes	33	47.1	19	27.1
No	2	2.9	16	22.9
<b>Earthquake Preparedness Information Resources</b>				
Teacher	16	22.9	0	0
TV	6	8.6	6	8.6
BMKG	0	0	13	18.6
Friend	1	1.4	0	0
Family	5	7.1	0	0
Media social	4	5.7	0	0
Other	1	1.4	0	0

Source: Primary Data 2019

Wilcoxon test results in table 2 indicate that an increase in the mean score of knowledge about earthquake preparedness from pre test (10.31), post test 1 (13.86) and post test 2 (14.80) in the intervention group after being given educational methods Simulation and media picture book. The results of the statistical test in the intervention group obtained the P value = 0.000 ( $P < 0.005$ ) this means that there is an effect of earthquake disaster simulation and picture book media against respondents' knowledge of earthquake preparedness.

Table 2. Knowledge score of respondents to the intervention and control group during pre test post Test 1 and post Test 2 at SDN 26 Pakkola and SDN 28 Tamo in Majene District in 2019

Statistical value	Knowledge Score		p Value
	n	Mean	
Pre test	35	10.31	0.000
Post test 1	35	13.86	
Post test 2	35	14.80	

Paired sample T Test result in table 3 showed that there was an increase in the average score (mean) attitude about earthquake preparedness from pre test (38.86), post test 1 (44.63) and post test 2 (47.54) on the intervention group after a simulation and picture books media. Test result statistic on the intervention group is obtained P value = 0.000 ( $P < 0.005$ ). This shows that there was an effect simulation and picture book media against respondents' attitudes about earthquake preparedness.

Table 3. The attitude score of respondents in the intervention and control group during pre test post Test 1 and post Test 2 at SDN 26 Pakkola and SDN 28 Tamo in Majene County in 2019

Statistical value	Attitude Score		p Value
	n	Mean	
Pre test	35	38.86	0.000
Post test 1	35	44.63	
Post test 2	35	47.54	

## DISCUSSION

Based on the results of the study that education with simulation methods and picture book media has an effect on students' knowledge of earthquake preparedness. Measurement of knowledge

and attitude in the study was conducted three times the measurement before the intervention (pre test), then the measurement after the intervention was done twice the two weeks after the intervention (post test 1) and four weeks after the intervention (post Test 2).

The results of knowledge measurement on pre test and post test 2 showed significant differences, this is because the respondent is able to remember and process the information that has been obtained during the intervention, it is in accordance with the expression Arif in Wahyuddin (2010) stating that a person's knowledge is derived from an 11% hearing experience, from a vision of 83%, while the ability to recall from what is heard by 20% and from what is seen by 50%.<sup>[20]</sup>

The research was reinforced by research conducted by Finnis et al (2010) who examined the level of knowledge, perception and disaster preparedness applications for children in Taranaki, New Zealand, indicating that there are differences in the knowledge scores Related to the catastrophic behaviour of self-rescue during the disaster between respondents who had received a disaster education exercise with the unheard of.<sup>[21]</sup> The same is pointed out by Lindell et al (2015) and Oral et al (2015) states that those involved in earthquake hazard exercises have higher knowledge than not.<sup>[22,23]</sup>

The study also showed a significant increase in mean attitude value at the time of pre test to post test 2 after intervention. The increase in the score is assumed because the respondent has experience in simulation action directly so that it is more motivated to perform the preparedness action. This is in accordance with Terpstra (2011) which states that having experience in the actions of previous disaster preparedness will strengthen the motivation to behave in subsequent disaster preparedness.<sup>[24]</sup>

Another study of Muttarak et al (2013) also showed that participating in a

disaster exercise can improve attitudes in conducting preparedness acts.<sup>[25]</sup> The same is said by Espina et al (2015) that the experience of having a positive effect on disaster preparedness in individuals.<sup>[26]</sup> Therefore, the experience that respondents had at the time of simulation would be their strength when facing earthquake disaster later on.

The increase in knowledge score and attitude is also assumed because the simulation process is fun and the facilitator conveys the simulation information with a simple style and also interspersed with entertainment. So the message is also more easily accepted by students. This is demonstrated during the simulation process the children look enthusiastic to follow the simulation activities of the exercise until the simulation process is completed. This is in accordance with the research conducted by Bandrova et al (2015) indicating that the presentation of information with simulated training and entertaining games makes children participate actively in educational activities.<sup>[27]</sup>

In addition to the appropriate teaching methods, the success of the educational process is also supported by the teaching media used. The proper use of media enlarges the meaning and function of supporting the effectiveness and efficiency of the education process.<sup>[28]</sup> Educational media used in this research is the media of the picture book because the target of educational elementary school children. One of the learning media that is suitable for the learning of elementary school students is picture books, because picture books can help develop children's emotions, get fun and stimulate children's imagination.<sup>[29]</sup>

Wulandari (2013) in her research showed that education with media picture books obtained the result of a gain test of disaster response gained an increase in the experiment group of 0.55 (medium), while the control group 0.32 (moderate).<sup>[30]</sup> It is means that picture books have an effect on improving the attitude of disaster response.

## CONCLUSIONS AND SUGGESTIONS

The research concluded that the education of earthquake disaster preparedness with the simulation method and picture book media has an effect on the level of knowledge and attitude of students in two Majene District Elementary School. A fun simulation game can make education preparedness can be absorbed by the students well. And the use of picture book media that can stir students' imagination on preparedness so that the respondent can be better prepared and know what to do. Therefore, it is advisable to the government for a mandatory curriculum that is in elementary school, so that information about disaster preparedness can be thoroughly. Simulated exercises should also be performed more frequently and reach the entire school to prepare students for a disaster emergency. In addition, the need to provide books on earthquake preparedness in reading rooms in schools especially picture books so that students are more motivated to read. So that it can increase knowledge and positive attitude about the preparedness of earthquakes.

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