

THE INFLUENCE OF EARTHQUAKE DISASTER RISK REDUCATION SIMULATION TOWARDS THE PREPAREDNESS KNOWLEDGE FOR ELEMENTARY SCHOOL STUDENT OF ULEE PAYA, PULO BREUH, ACEH BESAR, INDONESIA

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ABSTRACT

This study aimed to find out the influence of the preparedness method for elementary school student in encountering earthquake disaster. It was conducted at Elementary School of Ulee Paya, Pulo, Aceh Besar. The type of study was experimental by using purposive sampling technique. The population of the samples consisted of 5th grade and 6th grade students of Elementary School. The instrument used in this study was a test and non-test. The test instrument consisted of pretest and posttest, while the non-test was in the form of a questionnaire and recording. The ability of knowledge in this study consisted of 10 multiple choice questions that was given at the beginning and at the end of the study. The analysis of the data used in this research was by using paired samples t-test. The results of this study stated that the presence of a significant effect of $P < 0.05$ towards the students' knowledge of Elementary School of Ulee Paya, after they were given a material and given a simulation, compared the previous condition.

Keywords: *disaster simulation method, preparedness knowledge, and earthquake*

1. INTRODUCTION

The earthquake which is followed by tsunami in 2004 has claimed more than 250 million people both in Aceh province and coastal states that are surrounding the Indian Ocean. The main cause of the large number of victims that include the lack of preparedness and public awareness on the dangers of disasters. This is partly because it is still very weak in learning of natural disasters including earthquakes and tsunamis that have occurred previously in Indonesia (Anwar, et al., 2006).

Since Aceh has been attacked by earthquake and tsunami, many institutions have been involved in providing training through schools and the community to increase awareness and preparedness in facing of disaster. The students need to be guided not just knowing and understanding the disaster, but the more important is how they can deal with the disaster preparedness and responsive so that they are able to minimize the risk of disaster. Children who are still in Elementary School is the part of a community that can be prepared, be nurtured and trained become human resources that is ready in overcoming the disaster. In order to build a culture of safety and resilience, particularly for children and young people, one of the way is the application of disaster preparedness training that needs to be more developed starting from the level of basic

education. Learning from experience about the high incidence of natural disasters and other hazards that occur in Indonesia, the training is very necessary that includes the proper ways on how to save ourselves when disasters occur and also how to avoid unnecessary accidents that occur in our daily life .

Aceh island is one of the districts are located in the region of Aceh Besar district with an area of 240.75 km² (24 075 ha), has 17 villages and one of them is the village of Ulee Paya. Geographically, the coastal areas of Aceh Island directly adjacent to the Strait of Malacca in the east, while the northern, western and southern borders with Ocean Indonesia (BPS, 2013). The village is located on the island of Ulee Paya, Pulo Breueh, which is an island located in the northwest of the island of Sumatra and in the northwest of the island of Weh. In the view based on the coordinates, the island is located at coordinates 5°42'0"LU,95°4'0"BT. Administratively, this island including the island subdistrict of Aceh, Aceh Besar. And in this island, there is capital district of Aceh island, Lampuyang Village. (http://id.wikipedia.org/wiki/Pulau_Breueh).

Ulee Paya Elementary School is one of the elementary schools in Aceh island. The school which is located at Jalan Lingkar Pulo Aceh, has accreditation C since 2010. Pertaining to the context of disaster, Aceh Island is an area that is very prone to earthquakes and tsunamis because Aceh island is a series of islands located on the Acehnese fault segment. It is very active, and it is also flanked by the subduction zone of the Indo-Australian plate and Eurasia which at times can trigger earthquakes and Tsunami. In the context of vulnerable groups, this area still needs to be given more attention due to the limited access of construction, facilities and infrastructure in the region.

The results observed in Ulee Paya Elementary School of Aceh island in January 2014, concluded that the learning system is still conventional, where teachers and students listened deliver material without any practice or simulation of such material, including on subjects of Natural Science (IPA). According to Ruseffendi, (2005) that in the conventional method, the teachers are considered as warehouse science, teachers act authoritarian, and teachers dominate the classroom. It does not guarantee that students can understand the material that is presented by the teacher. However, Simulation method is a method of learning that involve the students in practicing the knowledge gained in conventionally. By using this method, the students will more easily understand the right way or the right actions performed when a disaster occurs so as to reduce the risk of disaster.

2. LITERATURE VIEW

2.1. Simulation Method

According Anitah (2007), the simulation method is a method of learning that can be used in a learning group. Learning process using simulation method tends to its object not the actual objects or events, but rather teaching activities that are pretending. Simulation activities can be carried out by students at higher grade in elementary school. Meanwhile, according Mufarrokah (2009), states that the simulation method is a learning method in the form of a game arranged, performed by students resulting in the learning process to gain an understanding of the meaning of a concept or principle skills through simulation. In a study that uses simulation methods, the student with the skills fostered his ability to interact and communicate in groups. In addition, the simulation method of the students were invited to play the role of some of the behaviors that are considered appropriate to the learning objectives.

The simulation method aims to: (1) train certain skills are both professionals and for everyday life, (2) gain an understanding of a concept or principle, (3) train to solve problems, (4) increase the activity of learning, (5) gives students' motivation to learn, (6) train students to conduct cooperation in group situations, (7) foster students' creative power, and (8) train students to develop tolerance (Nunuk, 2013).

2.2. Knowledge

Knowledge is the result out, and going after people perform sensing on a particular object. Sensing occurs in the human senses, the senses of sight, hearing, smell, taste and touch. Most human knowledge acquired through the senses of hearing, and sense of sight (Notoatmodjo, 2010). Knowledge is the main key factor in overcoming disaster risk preparedness. The knowledge possessed in general can affect a person's attitude and concern for ready and alert in anticipation of a disaster, particularly for those who live in disaster-prone areas.

In relation to the efforts of disaster prevention in Indonesia, the school as a public space that has a real role in building a national culture, including building a culture of disaster preparedness that citizens in particular to students through the transferring knowledge. Disaster preparedness knowledge transmission can be done with models and learning methods which are very simple. Indicators of knowledge and attitude of the individual is the basic knowledge that should be possessed by individuals include the knowledge of disaster, the causes and symptoms, and what to do in the incident of natural disasters (ISDR, 2009). Individuals or communities who have better knowledge associated with the disaster preparedness tend to have better than individuals or communities who have little knowledge.

2.2. Earthquake Disaster

An earthquake is a vibration at the surface of the earth / ground due to the release of energy that occurs suddenly by rocks under the surface. Earthquakes can damage in two ways, namely directly from the vibration that gives the effect of the horizontal force, and indirectly through liquefaction. Carlson, et al., (2006) argues that "an earthquake is a Trembling or shaking of the ground the caused by the sudden release of energy in the rock beneath trored earth's surface". An earthquake is a vibration or ground shaking caused by the release of energy stored below the earth's surface suddenly. Sudden movement of the earth is a way of relaxation to the normal state after an impulse, the urge, the collision shearing or friction between the plates, the phenomenon known as elastic rebound. During the relaxation process, the energy will spread in the form of waves that propagate into a corner and felt as an earthquake.

3. RESEARCH METHODS

3.1. Type and Research Design

This study used an experimental method because this study investigated the effect of a disaster simulation methods towards the students' knowledge in facing the earthquake disaster at Ulee Paya Elementary School, Pulo Breuh, Aceh Besar. The study design used as the basis for the implementation of this research was the One Group Pre-test and Post-tests Design.

3.2. Population and Research Sample

The population in this study were all students of class V and VI Ulee Paya Elementary School, Pulo Breuh, Aceh Besar. The sampling technique in this study was purposive sampling.

The sampling technique was chosen by the researchers because the researchers have certain considerations including the students in grade V and grade VI Ulee Paya Elementary School who are easy to work together, have a good understanding towards the knowledge, have attitude and want to practice disaster preparedness. In addition, students can be involved in earthquake simulation, and researchers more easily communicate and direct the fifth and sixth grade students than those of class I, II, III and IV. This is confirmed by Sundayana, (2012) which states that purposive sampling technique is used when the sample members were selected specifically based on the research objectives. The samples in this study were two classes selected from six classes in Ulee Paya Elementary School, Pulo Breuh.

3.3. Research Instrument

The instrument used in this study was a test and non-test. The test were a test instrument that consisted of pretest and posttest. While a non-test were questionnaire sheet, and recording devices in carrying out research on the simulation method of disaster preparedness for Elementary School students in facing the earthquake of disaster. The test was defined as a device used to measure the knowledge or mastery of a particular material. The ability of knowledge in this study consisted of 10 multiple choice questions given at the beginning and at the end of the study. The selection of multiple-choice tests aim to reveal the students' knowledge on the ability of the material science of disaster. Each question pretest and posttest was almost identical and the same weight. Pretest aimed to determine students' prior knowledge before getting treatment, while the posttest aimed to determine whether or not an increasing towards students' knowledge in learning after getting treatment.

3.4. Data Analysis

The data test results before and after earthquake preparedness materials analyzed by comparing pretest and posttest scores. The statistical test used in this study is the analysis of the paired t-test Samples T-Test.

3.5. Research Procedures

3.5.1. Preparation Stage Research

Before carrying out the study, researchers conducted preparatory stages are as follows.

- 1) Determine the sample based on the consideration of researchers and lecturers.
- 2) Designing a research instrument pretest and posttest questions, questionnaires attitudes and preparedness measures to assess the extent to which students' knowledge, attitudes and actions of elementary school students in facing of natural disasters.
- 3) Discuss with the supervisor of research instruments.

3.5.2. Implementation Stage Research

Having done the preparatory phase, the next phase of the study conducted by researchers is as follows :

- 1) Collection of data, in this case the researchers collected data by:
 - i) Collect the results of the pretest, posttest and questionnaire conducted thirty-student sample.
 - ii) Provide materials on disaster knowledge to class V and VI of primary school.
 - iii) preparation and implementation of disaster simulation.
 - iv) Documenting the earthquake simulation.

Once the data was obtained, the next stage researchers conducted data analysis resulting in a conclusion that was relevant to the purpose of this research.

4. RESULTS AND DISCUSSION

4.1. Effect of Knowledge Simulation Against Disaster Preparedness

Simulation is a person's behavior to act like the person intended, so that people can learn more about how people feel and do something. By simulating the natural disaster response, Ulee Paya Elementary School students are given education to help themselves in doing mitigation capabilities inside and outside the classroom when an earthquake so that the child can save himself.

Mitigation is the act of a person to reduce the impact of a disaster that can be done before the disaster occurred. Generally, we know that the earthquake was threatening someone, and that someone had to do to save himself mitigation as well as elementary school students, so it needs to be taught to children at school, and the teacher should be able to find a suitable and attractive way in persuading the child to learn. While doing research to simulate mitigation in the classroom when the earthquake occurred, the child attracted to mitigate and children were active to do the simulation in the classroom when the earthquake occurred. While the previous time, the child was only taught by giving an explanation.

The earthquake simulation was intended as a basic knowledge of anticipation in reducing both material losses and casualties before. This simulation was conducted on March 22, 2014, at Ulee Paya Elementary School, Pulo Breuh, Aceh Besar. The samples of the drill earthquake were class V and VI of Ulee Paya Elementary School student. T-test results on the effect of knowledge preparedness simulations can be seen in Table 4.1. Based on the analysis of T test knowledge of Ulee Paya Elementary School students towards the knowledge in facing natural disasters indicate that there is no significant variation $p > 0.05$ on the provision of material both before and after the administration of the material, this is because the students of Ulee Paya Elementary School already know and understand what was a natural disaster, this is in accordance with the students' understanding of the earthquake stating that the matter before administration and after administration of the material showed no difference, meaning that students have understood what it was an earthquake.

For understanding students' knowledge of Ulee Paya Senior High School student towards the power of the earthquake recording devices showed significant differences in the occurrence of $p < 0.05$ which said that given the material before students do not know what it gauges the earthquake, but after the material was given, the earthquake gauges students' knowledge was increased. While for students' knowledge of the earth and its layers, indicating that the absence of difference between before and after the coating material on the earth and $p > 0.05$. This is due to the understanding of the students to comprehend the material presented was still low.

In the table of t-test analysis, the behavior of an earthquake in the classroom showed a significant difference $p < 0.05$ between before and after the material was given, it indicates that an increase in students' understanding of the behavior of an earthquake. The results of the study Astuti, et al., (2010) showed that students in the region who often occurs earthquakes still showed objective perception of the seismic events that can recognize the signs of an earthquake such as lost property; the number of deaths and disease. Although students have fears, but students still have protective factors as capital to build resilience through a desire to learn knowledge about disaster anticipation.

Table 4.1. The Influence of Simulation towards Preparedness Knowledge

Pertanyaan		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	1	0.03333	0.61495	0.11227	-0.19629	0.26296	0.297	29	0.769
Pair 2	2	0.23333	0.93526	0.17075	-0.1159	0.58257	1.366	29	0.182
Pair 3	3	0.1	0.71197	0.12999	-0.16585	0.36585	0.769	29	0.448
Pair 4	4	-0.6	0.56324	0.10283	-0.81032	-0.38968	-5.835	29	0
Pair 5	5	-0.3	0.53498	0.09767	-0.49977	-0.10023	-3.071	29	0.005
Pair 6	6	0.1	0.48066	0.08776	-0.07948	0.27948	1.14	29	0.264
Pair 7	7	-0.73333	0.86834	0.15854	-1.05758	-0.40909	-4.626	29	0
Pair 8	8	-0.03333	0.18257	0.03333	-0.10151	0.03484	-1	29	0.326
Pair 9	9	-0.16667	0.64772	0.11826	-0.40853	0.0752	-1.409	29	0.169
Pair 10	10	0.3	0.65126	0.1189	0.05682	0.54318	2.523	29	0.017

Specification:

- 1) Which includes natural disasters are as follows, except ($P > 0.05$),,
- 2) What is the Earthquake ($P > 0.05$),,
- 3) How many layers does the Earth composed of ($P > 0.05$),,
- 4) What is the name of the power of the earthquake recording devices ($P < 0.05$),
- 5) How does an earthquake in the class ($P < 0.05$),
- 6) How to face an earthquake outside of class ($P > 0.05$),,
- 7) What is Preparedness Bag ($P < 0.05$),
- 8) What should be put in a bag in standby ($P > 0.05$),,
- 9) How strength the earthquake can bring the potential tsunami ($P > 0.05$),,
- 10) Where is the place that is safe from the threat of tsunami ($P < 0.05$).

The provision of material about the need for preparation in facing of disaster alert bags to students of Ulee Paya Elementary School indicates $p < 0.05$, which stated that there was significant given the material after than before the disaster provision of material science. It caused by students of Ulee Paya Elementary School who did not understand previously what it means to preparedness bag. From the research Suwarsono, *et al.*, (2013) showed the majority of residents in disaster-prone villages already aware that settlements prone to earthquake and tsunami, so that when the big earthquake, all the people in the village will be ready on standby to evacuate to the assembly points more secure location in particular, especially the children and the mother. Generally, people are not even prepare everything such as clothes, important papers were prepared in a tote bag and even foodstuffs that should be taken to evacuate if there is a sudden threat of a tsunami.

In addition, students' understanding of what equipment should be put into preparedness bag indicated that $p > 0.05$ which stated the absence of the influence of increasing student understanding of the equipment that was included in the preparedness bag, either before or after the material was given. It is caused by the equipment that was put into preparedness bag equipment was already know before.

The students' understanding of the direction in which the place is safe from the threat of a tsunami, the results of the analysis indicate that $p < 0.05$, which indicates that the student's knowledge of the direction in which the place is safe from the threat of a tsunami increases compared to before the given direction. This is because of the materials which are delivered to students in the form of simulations directly in the field so that students know the areas that are safe from the threat of a tsunami. According to Villagran de Leon (2006), the purpose of an early warning system is to inform the public that in a very short time there natural hazards and allow the community to save itself to a safer place as soon as possible. Thus the moments that

are very vulnerable in the early warning process is when the contents of the warning can be understood so that it can be understood or responded well by society (Anwar, 2011). Starting measuring is when people listen to the warnings in a short time then the man can save himself or to evacuate to a safer place.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Based on the research that has been conducted, it could be concluded that the simulation of earthquake disaster preparedness can help and improve students' knowledge of Ulee Paya public elementary school in facing the earthquake. In addition, students who obtain earthquake preparedness education has increased knowledge of the earthquake phenomenon, mitigation and emergency response measures. They have a real perception of the possibility of danger. Students also play an active role in the dissemination of information for disaster risk reduction in their home.

5.2 Suggestions

It is advisable for students to be able to continue to gain knowledge about earthquakes and other disasters and disaster mitigation. While the elements of school is expected to be able to make a better disaster simulation routine school to their elementary school so the students will more getting understand how to overcome the disasters, especially earthquakes.

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