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File name: Ardni_2020_IOP_Conf._Ser.__Earth_Environ._Sci._589_012028.pdf (939.04K)

Word count: 5976

Character count: 32075

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The Development of Earthquake Risk Reduction Curriculum for 4-6 Years Old Children in Gorontalo

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Abstract: This research was conducted for the development of earthquake risk reduction curriculum for children aged between 4-6 years old in Gorontalo. This research used Research and Development method. The data analysis technique used in this research is qualitative data analysis technique Milles and Hubberman model and quantitative data analysis using the t-test. This research was conducted in Gorontalo. The researcher modified the Dick and Carey's design of research and development. Step 1, the researcher did a preliminary study through literature studies related to the concepts of models to be developed. Then, the researcher did the field study for the initial knowledge on the disaster risk reduction curriculum for children aged between 4-6 years old. Next, the researcher performed required analysis as the basis for developing the model. Step 2, is the development stage and step 3, is the implementation of the earthquake risk reduction curriculum program model. The research is still in step 1. The duration of this research was one and a half years. The data were collected through interviews, forum group discussion, observations, and documentation. The first year research was to conduct preliminary research to collect information (literature review, preliminary observation). In addition, the researcher identified the problems encountered in the learning process. Then, the researcher evolved the planning (identification and definition of skills, purpose, determination of learning sequence), and then finally, conducted the expert test or expert judgment. The first Development product includes Program design of disaster risk reduction curriculum. There are three main processes in the curriculum: the concept stage, the training phase, and the rehabilitation phase. Activities in three stages of this process through a series of curriculum development frameworks comprise the determination of learning objectives, then the learning process, and the evaluation process (for early childhood phase, the learning process is more important than the outcome). Last but not least is the reflection stage to review the design and improve the learning objectives.

Keywords: Curriculum; 4-6 years old children; Disaster; Earthquake; Risk-reduction program

1 Introduction

Indonesia is one of the countries that are in between major tectonic plates Indo Australian plate, the Eurasian and Pacific. In Indonesia Often happen natural disasters, especially tectonic and volcanic earthquakes. The frequent occurrence of natural phenomena requires efforts to reduce the risk of



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disasters that can occur. (World Bank International Financial Cooperation Group, 2014) [1]. Thus, preparation needs to be done not only related to infrastructure development but also the readiness of the population to face natural disasters.

This research only examines the earthquake disaster, because of the earthquake incident, including the quite frequent disasters in Gorontalo. This disaster has symptoms that are present suddenly and shocks in addition to causing physical damage to the buildings can also cause casualties due to ruins. The earthquake in Gorontalo sometimes occurs in the early hours of the day and during school hours. To reduce the number of deaths, especially students in schools, it is necessary to create a curriculum to prepare it in order to minimize the effects that occur after the earthquake occurred. (Simpson, 2002: 55-69) [2]. The curriculum created not only training programs during the earthquake but also after the earthquake occurred, namely the psychological rehabilitation program to deal with traumatic after the earthquake.

This preparation program also needs to be done early because at this age 75% of the brain develops rapidly. Especially at the age of 4 years. Early childhood is a creative period, full of imagination and play (Einon, 2006: 6) [3]. The development of the children's brain, more dominant in the right part. the Stages of cognitive development of children receive information and then process it through a concrete or real understanding. It makes children need a real action such as touching, feeling, and even exploring an object. Through these activities the child can gain knowledge, can learn to know something. Not only cognitive development, the development of various other aspects such as language, motor, emotion, social creativity and so on are still in the early stages of a development, these stages of development are the basic foundation for the next stage. (Hebb, <http://edukasi.kompasiana.com/2010/11/29/otak-tak-sekedar-folder-penyimpan322464.html> (downloaded on January 12, 2016) [4].

This is contained in the standard process of organizing Early Childhood Education in Indonesia according to regulations of the education minister number 137 and 146 in year 2013, that learning is done by playing and scientific approach. Some other principles include that learning is done in stages, continuous, and child-centered approaches are important in children's learning activities. This is related to aspects of child development that will develop in stages and sustainable. In addition each child has their own uniqueness, not every child has the same developmental rhythm, so the teacher needs to pay attention to each of these individual differences through child-centered learning in accordance with the interests and needs of the child (Regulation of the Minister of National Education of the Republic of Indonesia Number 137 and 146, 2013) [5] [6].

In Indonesia, the curriculum on earthquake risk reduction for preschool children has not been widely studied. The National Disaster Management Agency has already designed but it is for elementary school students. Disaster risk reduction programs require special designs that are appropriate to the pre-school development stage. In this case for children aged 4 to 6 years or at the level of kindergarten. Early Childhood needs to be given a learning experience about protecting themselves in the event of a disaster and how to save themselves by reducing the risks that occur. Not only scientifically but also practically practiced directly. The results of this research are the prototype of earthquake risk reduction curriculum, technical manual for earthquake disaster risk reduction for teachers, child worksheets related to the technical implementation of earthquake risk reduction, and video management of earthquake risk reduction.

According to Click and Karkos, early childhood curriculum program consists of two types, namely short-term planning and Long-term planning. Short term planning is an activity planning program that is done every day. Starting from the weekly planning and daily planning. Meanwhile, Long-term planning is an activity program from the start of learning objectives, environmental arrangement, in accordance with the needs of children and stages of child development. (Click and Karkos, 2008: .14-13) [7].

Click and Karkos also suggest several types of programs, including half-day schools and All-day schools. (Click and Karkos, 2008: h.44-56) [8]. The half-day school has a four-hour study meeting session or more. The purpose of this type of program is to serve children from 2-6 years as a preparation for children before entering the institution of education at the next level of primary school. These

programs are called pre-school programs, learning centers, and early childhood education centers. Some schools also have programs for infants and toddlers.

All-day schools have sessions of learning activities for more than four hours each day, for ten to twelve hours. The purpose of this program is to provide stimulation and care to children while parents work. This type operates for 12 months of the year and does not operate on certain national holidays or holidays. So, the curriculum program is a framework that describes the content that will be learned by the children in the school, the process earns based on the identification of the learning objectives. The teacher helps the child achieve the goals and content/learning materials for 2-4 hour or more (half-day school) called long-term planning and a daily planning program called short-term planning.

This research is conducted to help the government, especially the ministry of education and culture to prepare children from an early age to face natural disasters and reduce the risk that will occur. In Indonesia, the curriculum on disaster risk reduction has not been widely known in the community. It is expected that Indonesia will follow Japan or other countries that have been integrated into preparing the disaster risk reduction curriculum in schools.

An earthquake is a sudden vibration that shakes and moves an object. The objects in question are buildings, houses, poles and so on that are on the earth. "An earthquake may be a sudden violent jolt and a shaking and moving of objects." (Ministry of Education: 2000,1) [9]. This sudden shock does not infrequently cause a person to panic in order to save themselves, the panic can actually cause some risks that arise, such as crushed buildings, hit objects in front of him, or even fell. In order to reduce this risk, it is necessary to have special programmed training or learning (The Federal Emergency Management Agency, 2005: 3) [10]. On the other hand, an earthquake disaster occurs during school hours, teachers or other adults can more easily rescue these students without panic. Such training is already widely available in some countries that are prone to earthquakes, but still rare in Indonesia.

The Earthquake Risk Reduction Program is a Training conducted both indoors and outdoors in an effort to save children in school and risk reduction in the event of an earthquake (The Federal Emergency Management Agency, 2005: 3). [11] This activity consists of several stages including taking cover, face away, assume crash position, count aloud. Take cover is shelter under the table to protect the ruins. Face away is away from the window because the glass material can hurt. Assume crash position is when walking out of the building head position is covered, knees bent and other hands are behind. Count aloud is counting aloud together until 60 because the aftershocks vibration occurs after 60 seconds. The teachers remain calmly directing all the students out of the class while continuing to guide count to 60 and calm the students.

Earthquake risk reduction programs require careful planning. Before preparing the curriculum the researcher also designs the goals of the program. Some steps when implementing this program is the stage of delivery of knowledge first. Clearly explain the risks that occur when an earthquake (America's Prepareathon, 2014: 3) [12].

For early childhood stage of child's cognitive development is intuitive, it is necessary to use projection media such as video or non-projection in the form of miniaturized simulation of the earthquake. After the later explanation together with the teacher to practice directly. Thus, starting from the explanation of the concept, to direct practice takes time. In Indonesia for kindergarten and playgroup programs have a theme of learning about natural phenomena. Thus, the earthquake risk reduction program is relevant to the theme, the training activities can be done as the "top of the theme".

In addition to programs to reduce the risk of earthquakes when the earthquake occurs should also be designed in a sustainable after the earthquake occurred. Because psychologically children will stress or depression. Thus, teachers and adults need to ensure the child's comfort after the earthquake. (Sesame workshop, 2014: 3) [13]. Some steps include: Provide Comfort, model healthy ways of coping, try to keep one routine, create a safety net, monitor the media. Provide Comfort is making children feel comfortable. This therapy can use aids such as soft blankets or dolls. Model of healthy ways of coping is to be a good model because the children are master imitators. Therefore, adults around children should be calm so that children also be calm. Try to keep doing the usual routine before the earthquake. This should also be adapted to the situation and conditions, for example reading the story before going to

sleep, pray before bed, or other routine activities. Creating a safety net is an effort to keep the atmosphere and the situation so that children do not return to remember the earthquake which will make the child sad and afraid. Next monitor the media is an attempt to prevent children from impressions that reflect the back of the damaged state by the earthquake because it can make the trauma back.

2. Data and Method

From the research problem, this research uses research and development approach. Research and development are the process of research based on user needs and follows product development as needed. According to Borg and Gall (2003: 569) [14].

The objectives of this research are: 1) Develop earthquake disaster risk reduction curriculum for children aged 4-6 years in Gorontalo, 2) Undertake the process of developing earthquake risk reduction curriculum for children aged 4-6 years in Gorontalo, 3) Design the final model of development earthquake risk reduction curriculum for children aged 4-6 years in Gorontalo, 4) Developing techniques for implementing earthquake risk reduction curriculum for children aged 4-6 years in Gorontalo. they were explains that, the ultimate goal of research and development is to produce new products or improvements to the old product, then do experimental tests to get the final model. The step of research and development design as shown in *Figure 1*.

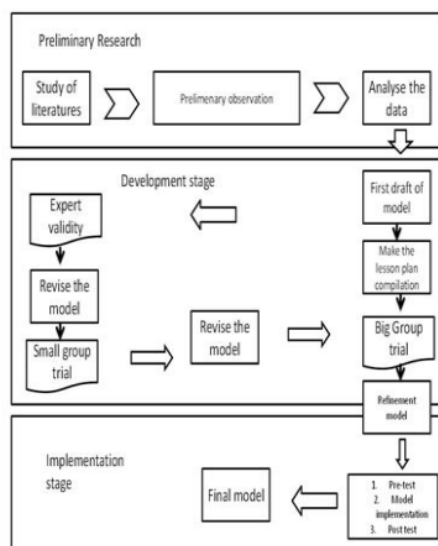


Figure 1. The Research and Development Stage Design of Borg and Gall (2003:569)[15]and Dick and Carey (2009:1)[16].

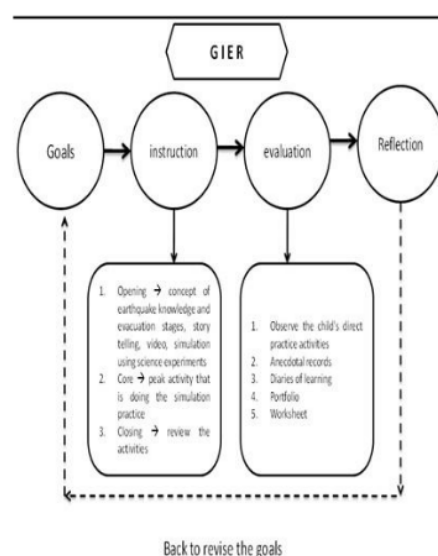


Figure 2. Design of the concept of curriculum

2.1. The Step of Curriculum Model Development

2.1.1. Preliminary Research. The preliminary research was conducted in Limboto, the city of Gorontalo District and The central of Gorontalo City. This stage is done to collect preliminary data at the research site. The City and District of Gorontalo were chosen as the location for preliminary research because this region is representative of the provincial capital region as well as the district capital region of Gorontalo province. In both areas, there is no curriculum for disaster risk reduction programs in early childhood or kindergarten.

2.1.2. Design the Curriculum. The curriculum development design consists of determining the learning objectives, then compiling the learning process, and the evaluation process (in early childhood the process is more important than the outcome), then the reflection phase to review and improve the learning objectives.

Stage the curriculum implementation consists of four cores abbreviated as G I E R. G is Goal, I is Instruction, E is Evaluation and R is Reflection. The goal is a concept of learning objectives, which in this case is so that children know how to evacuate when an earthquake occurs. Instruction is a core part of the implementation, namely the process of carrying out evacuation drills that begin with the delivery of concepts about the earthquake to the practice of evacuation. Evaluation is an activity of gathering information about the success of the program's implementation, in which there are observation activities, a total record and also a portfolio of children's activities. The last is the Reflection section which is the activity of the teacher to reflect on activities in the program. The teacher makes a reflection, whether the activity is effective or needs improvement. if it requires improvement, the teacher innovates activities so that the program becomes effective. If the activity is effective, the teacher will proceed to the next stage of the program. The first curriculum design as shown in *Figure 2*.

2.1.3. Validation, Evaluation, and Revision the model. The next step after planning the development of the model is to validate, evaluate, and revise the model. Based on the above statement it can be seen that the purpose of the evaluation stage is to provide an overview of the advantages and disadvantages of the model developed during the stages of the development process. The result of the evaluation is a step in revising so as to produce a good quality model. The explanation of the formative evaluation stage that is carried out is as follows:

- Expert Validity (one to one expert). The stages of validation of the developed model are implemented by involving experts. Experts review the developed model, then the expert's findings are used as the basis for revising and/or validating the developed model. The experts involved are experts in the design of early childhood play programs and the material/content experts in early childhood activities. The technique used is the researchers met one by one with each expert. The instrument used in the expert review process is an open questionnaire.
- One to one test. The procedures performed in one-on-one test are: (1) the researcher selects three children with different abilities and matches the characteristics of early childhood; (2) the researcher performs the play activities according to the developed model; and (3) the researcher observed the changes that occurred in the three children using the observation sheet.
- Small Group Trial. The steps that were tested in small groups were: (1) the researchers selected 8 children who had characteristics appropriate to the characteristics of early childhood; (2) make initial observations using observation sheets; (3) conducting activities according to the developed model; and (4) observe the changes occurring using the observation sheet.
- Big Group Trial. Trials in big groups were: (1) researchers selected 30 children who had characteristics according to the characteristics of early childhood; (2) make initial observations using observation sheets; (3) conducting activities according to the developed model; and (4) observe the changes occurring using the observation sheet.

2.1.4. Model Implementation. The researcher will implement a model that is evaluated and revised. Implementation of models that have been developed implemented by considering the cost, energy, and time owned by researchers.

3. Result and Discussion

The research conducted is in the preliminary study stage up to the stage of the draft model findings. In the preliminary study stage, the researchers conducted a Group Discussion Forum with several groups of Kindergarten teachers. This Forum was held in a large event as well as small group discussions.

In the preliminary study, observations were made about the quake in Gorontalo, its characteristics, and the consequences that occurred after the earthquake. Based on data from the Meteorology and Climatology Agency in 2017 there was an earthquake up to three times a year. In July, October, and December. In October the earthquake occurred up to two times a six-minute interval. In the 2013 curriculum for early childhood, there is a theme that deals with natural phenomena. This theme in the academic calendar is in the even semester. One of the natural symptom materials is the natural disaster that is the earthquake. The fact that happens in Gorontalo is one of the positive values for children in terms of learning through experience.

Stages of cognitive development of children who are at the concrete operational stage where children learn based on concrete information make the earthquake event in Gorontalo is a source of information that is very supportive of children's learning experience. To be more optimal and children not only get information related to earthquake knowledge alone. Children also need a direct practice of how to evacuate themselves in the event of an earthquake, because each child has different learning styles. Based on the observations of researchers when asked directly to the children then who will direct the child to do when an earthquake is running to save themselves. Though there are several steps that must be done so that children do not panic in the event of an earthquake and reduce other risks arising from panic. This activity is shown in *Figure 3*.



Figure 3. Question and Answer Process with children about earthquake.



Figure 4. The Forum in International Seminar.

The Group Discussion Forum was done during the International Seminar held by the Department of Early childhood Education Departement Faculty of Education in collaboration with the Master Program of Graduate Elementary Education of Gorontalo State University. The Forum was held on March 19, 2018. This activity is shown in *Figure 4*.

Small group forums were conducted by inviting school principals and early childhood teachers representatives from Gorontalo city, Gorontalo, Gorontalo Utara, Boalemo and Pohuwato districts. The forum was held on March 31, 2018. This activity is shown in *Figure 5*.



Figure 5. Small Group Forum Group Discussion of Kindergarten teachers in Gorontalo.



Figure 6. Small Group Forum Group Discussion with student of early childhood education department.

The forum is also conducted by inviting some representatives of students who have been doing teach practice. To obtain data on how important the disaster risk reduction curriculum is made, and then to ask for inputs and form suggestions from the curriculum. A small group forum of student representatives was held on April 4, 2018. This activity is shown in *Figure 6*.

Based on the Forum it is concluded that principals and teachers strongly support the formulation of the disaster risk reduction curriculum for children. Because this is also a form of support to the government based on Law number 24 of 2007 on disaster management. Children aged 4-6 years are in the golden period of development. The stage of early age is the basic foundation for the next stage of development. So, it is very important to be introduced to the child. Some teachers suggest to researchers to make collaboration workshops between parents and teachers so that the program can be done together both at school and at home.

Based on Forum results and observations at the study sites. The researchers designed the concept of disaster risk reduction curriculum. There are three main processes in the first curriculum are the concept stage, the training phase, and the rehabilitation stage. These stages are shown in *Figure 7*.

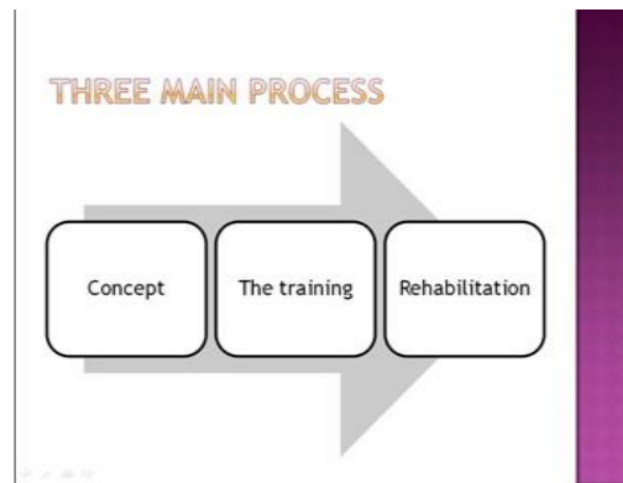


Figure 7. Three Main Process of Curriculum.

At the Concept stage, the focus is on providing a concept of knowledge to the child about the earthquake, related to the understanding, the characteristics of the occurrence, and the consequences of the earthquake. In the concept process is designed learning objectives, learning approaches used, materials to be provided along with the medium is also a method of learning used when delivering the material. In the process of conveying the concept not only to convey knowledge through storytelling but also to practice direct and experiment as well as singing.

At the Training Stage, focus on evacuation steps during the earthquake. At this stage, the children perform a self-sustaining simulation during an earthquake. All the school residents participating in this simulation are not just children. One of the classroom teachers invited resource persons from the Regional Disaster Management Agency to conduct the simulation.

In the Rehabilitation Phase, the focus is on the psychological steps of children who are experiencing an earthquake. Earthquake events can affect children psychologically. Causing the child to experience trauma or anxiety disorders. Thus requires handling after an earthquake. In this case, the teacher invites resource persons from psychological institutions and also entertainers. Psychologists play a role in psychotherapy children and entertainers such as clowns play entertaining children through the attractions.

Activities in the three stages of this process through a series of curriculum development frameworks comprise the determination of learning objectives, then the learning process, the evaluation process (in early childhood the process is more important than the outcome), then the reflection phase to review and improve the learning objectives.

At the *big group trial* stage, the quasi-experimental quantitative approach was carried out to see the effect of the implementation of earthquake mitigation curricula on children's ability to mitigate the effects of earthquakes. These data are the comparison before and after the curriculum is applied. The description of the children's ability to mitigate the effects of the earthquake in this study can be seen in the table that has been presented in the form of Mean (X), Median (Me), Mode (Mo), Standard Deviation (S), Variance (S²), Minimum (Min), Maximum (Max). The data are shown in *Table 1*.

Table 1. Descriptive Statistic.

Statistics		pre-test	Post-test
N	Valid	30	30
	Missing	0	0
Mean		43.47	54.37
Std. Error of Mean		1.128	.957
Median		42.00	54.00
Mode		39	56
Std. Deviation		6.180	5.242
Variance		38.189	27.482
Range		21	22
Minimum		35	44
Maximum		56	66
Sum		1304	1631
Percentiles	25	39.00	51.00
	50	42.00	54.00
	75	47.50	56.75

In the previous table, it can be observed that the pre-test of children's ability to do the earthquake mitigation activities has a mean value (X) 43.47, median (Me) 42.00, mode (Mo) 39, standard deviation (S) 6.180, variance (S²) 38,189, minimum (Min) 35, and maximum (Max) 56.

Then for the post-test value the ability of children to do the earthquake mitigation activities produces a mean (X) 54.37, median (Me) 54.00, mode (Mo) 56, standard deviation (S) 5.242, variance (S²) 27,482, minimum (Min) 44, and maximum (Max) 66.

Then the researcher analyzed the data using the t-test and produced an analysis that there was an effect of the implementation of the earthquake mitigation curriculum on the ability of children to do the earthquake mitigation activities. So that, this effort can reduce the risk that would occur due to the earthquake. The results of data analysis are in *Table 2*.

Table 2. Data analysis using the t-test.

Independent Samples Test										
		Levene's Test for Equality of Variances			t-test for Equality of Means					
		F	Sig.	T	df	Sig. (2-tailed)	Mean Diff.	Std. Error Diff.	95% Confidence Interval of the Difference	
									Lower	Upper
the ability of children to carry out earthquake mitigation activities	Equal variances assumes	1.084	.302	-7.367	58	.000	-10.900	1.480	-13.862	-7.938
	Equal variances not assumed			-7.367	56.498	.000	-10.900	1.480	-13.863	-7.937

From the previous table is obtained the value of sig. (2-tailed) = 0,000 and the critical area of α is 0.05. Because of the value of sig. (2-tailed) = 0,000 < 0,05, H_0 is rejected, which means that there are differences in values before and after the curriculum is applied.

Several previous kinds of research have been conducted on the development of an earthquake risk reduction program. Brown has researched the development of a practical guide to disaster response in New Zealand (Brown, 2011: 86-89) [17]. This research develops three stages of disaster response, namely respond, recover and renew. The respondent stage is the first stage of psychological help when disaster strikes. The recovery stage is the stage of providing support to staff and students to return to school. The renew stage is the moving phase or stage for the school can return to normal activities.

Subsequent research is a research conducted by Baytiyeh on Lebanon's disaster risk reduction strategy in Lebanon (Baytiyeh, 2015: 245-258). [18] The study makes the curriculum of earthquake risk reduction programs at universities in Lebanon. The curriculum was made in relation to the disaster response and recovery program after the earthquake disaster in college. Other research studies conducted by Mutch and Gawith about the role of schools in handling the emotions of children who experienced the earthquake disaster. (Mutch and Gawith, 2014: 54-67) [19].

4. Conclusion

Based on the results, it can be concluded that schools, especially principals and teachers, strongly support the formulation of disaster risk reduction curriculum for children. Because this is also a form of support to the government based on Law number 24 of 2007 on disaster management. Children aged 4-6 years are in the golden period of development. This period is the basic foundation for the next stage of development. So, it is very important to be introduced to the child. Some teachers suggest to researchers to also make workshops to parents together with teachers so that the program can be aligned to run both at school and at home. Design of the concept of disaster risk reduction curriculum. There are three main processes in the first curriculum are "the concept stage, the training phase, and the rehabilitation stage".

Activities in the three stages of this process through a series of curriculum development frameworks comprise the determination of learning objectives, then the learning process, the evaluation process (in early childhood the process is more important than the outcome), then the reflection phase to review and improve the learning objectives.

Last but not least, based on analyzing the data using the t-test and produced an analysis of the value of sig. (2-tailed) = 0,000 <0,05, so the value of H0 is rejected, which means that there are differences in values before and after the curriculum is applied. So, there was an effect of the implementation of the earthquake mitigation curriculum on the ability of children to do the earthquake mitigation activities.

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Appendix
Lesson Plan Of Curriculum
Theme : natural phenomenon in Indonesia
subof themen : Earthquake

Material	Activities	Media	Method	Assessment
<ul style="list-style-type: none"> - Prepare the needed items when disaster strikes - Remind the parents to turn off the power when a disaster occurs to follow older people to move to a safer place. - how to save yourself in the earthquake 	<p>Games and simulations by forming multiple spots.</p> <p>1. The first spot is the Emergency Bag Spot. In this spot, the child is divided into several groups. Each group was given a backpack. After that the teacher gave an explanation on the importance of preparing emergency bags and the concept of items that need to be put into the bag, the children are asked to pass the track as far as five meters and take the items that have been arranged in the closet. The selected items are then put into the backpack.</p> <p>2. The game is continued with Spot 2, which is Simulation Cheers. In this spot, children are</p>	<ul style="list-style-type: none"> - Picture cards of the items needed in the earthquake. - Bag Pack - Simulation Video - Miniature 	<ul style="list-style-type: none"> - Question and Answer - Games of simulation - Practicing 	<p>that the simulation activities of earthquake disaster have never been done in kindergarten</p> <p>Providing knowledge and direction about earthquakes to children</p> <p>Describe how to act to save oneself in earthquake disaster situations to children</p> <p>Provide stimulus to the cognitive and socio-emotional development of the child associated with learning (thinking and reasoning), attention (attention of the child in response to given stimulus), memory (memory of the child), language (children's understanding of what is spoken and able to speak what which has been heard and learned).</p>

			<p>given education on how to evacuate themselves in disaster situations. If you are on the first floor when an earthquake occurs, immediately run out of the building and gathered at the gathering point, for example, the field</p> <p>3. Spot 3 is how to save yourself in the room and cannot escape is hiding under a strong table or chair. Teach the children not to panic by getting used to praying when disaster strikes. Children are also asked to shout loudly for help from the people around him.</p> <p>4. at the last spot is the Brain Play spots, children play games that train to understand after following some simulation spots. Here, children are trained to think fast and creatively using the items that are around to survive or survive in times of disaster. in this activity,</p>	

			the child looking for pictures then run and categorize objects used to survive.
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Learning Media





Miniature and Video



The Development of Earthquake Risk Reduction Curriculum for 4-6 Years Old Children in Gorontalo

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