

The Implementation of Mitigation Disaster as a Way to Increase the Student's Disaster Alert in Metropolitan Bandung Raya

**Neneng Fenti FATIMAH, Mohammad Adietyarahman Sulistio ARDJO,
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Key words: Mitigation Disaster, Earthquake, Lembang Fault and Disaster Alert

SUMMARY

Metropolitan Bandung Raya is the region that in Basin Bandung with a population of about 5.813.269 inhabitant. Geologically Metropolitan Bandung Raya located near the fault which could result in earthquakes. It is Lembang Fault. Lembang Fault is a landscape having long ± 22 km and wide ± 300 meters transverse from the east heading west. Fault will begin with the foot of the Manglayang mountain to Cisarua Cimahi. The fault that extends up to the end of Cimandiri Fault this always experience movement so identified could cause earthquake the range between 3,3 to 6 scale richter. Researchers from LIPI and the ministry of research and technology, ensure that Lembang Fault can experience movement. The movement of the Lembang Fault can produces vibratory earthquake to 6 scale richter, of the quaver had an impact that so violent given the amount of densely populated, for that preparation for disaster an earthquake is needed especially for student in the school who do not yet know how to deal with earthquakes. The purpose of the writing this is to provide information and learning innovation in the face of disaster especially the earthquake. The methodology that was used to increase alert student may be using methods field studies. A method of field studies is the learning methods that have been carried out outside of class by means of asked the children to perform the process of observation, as well as an analysis of the identification object directly and real. The result of the application a field studies methods in their experiences disaster mitigation namely can improve disaster alert for student in Metropolitan Bandung Raya Indonesia. The application of this method effective in learning disaster mitigation because the information can be applied directly in the life especially in the face of events earthquake comes. So that they are ready in the face of disasters whenever.

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I. INTRODUCTION

Bandung Metropolitan Area Indonesia is an area that is located in a large cauldron-shaped basin, the basin known as the Bandung Basin. Administratively, this area belongs to the area of the provincial capital of West Java. Geographic position Bandung Basin is located at 7 ° South Latitude and 107 ° East Longitude, causing the area humid tropical climate with a rainy season between the months from October to May and the dry season between June to September Month (Bachtiar and Syafriani, 2012). Humid tropical climate with high rainfall makes the land in this area is very fertile. Fertile soil is influenced also by the presence of active volcanoes that surround the Metropolitan Bandung Raya, so this type of land area is mostly in the form of volcanic soil. Based on Metropolitan Development Management in West Java (2013), the population of Metropolitan Bandung Raya Indonesia amounted to 5,813,269 inhabitants in 2010. Residents in this area belong to the dense population. It is characterized by so many migrants from other regions and the high birth rate in this area. Based on geological conditions, Metropolitan Bandung Raya near fault lines. Fault is vertically and horizontal movements that cause the earth's crust to become brittle or broken. This fault is not only in the oceanic crust, but this fault can be formed on the continental crust (the crust mainland). Fault found in this area known as the Lembang Fault.

Lembang Fault is a fracture that extends ± 22 km and is divided into two parts: the northern part moving relative down (Slenk) and the southern part lifted (Horst). Territory relatively move down it starts from the town of Lembang, Cisarua, Maribaya up to Batu Lonceng Cibodas (Kusumadinata, 2011). The result is the formation of an escarpment (straight slope) which is a sliding plane dent fracture are clearly visible from Lembang eastwards. In accordance with the West Java Provincial Regulation No. 1 Year 2008 on controlling the use of space Region North Bandung, which states that the patterns of utilization of Region Northern Bandung including in areas prone to natural disasters geological covering regions prone to volcanic areas prone to ground movement, and areas prone to earthquakes due to a Fault Lembang. The susceptibility of the disaster in a densely populated area into a separate hazard because when a disaster occurs, it can be identified that a dense population contribute to the high number of casualties.

The susceptibility of the earthquake, evidenced by the presence of an earthquake that occurred in District Cisarua exactly what happened in July, late August and October 2011. This was confirmed by Bachtiar and Syafriani (2012) that "during the 2011 Area fault lembangs often experience movement causing a catastrophic earthquake measuring up to 3.3 on the Richter scale that directly destroy the houses above the fault lines ". The resulting strength of the quake at 3.3 on the Richter scale, judging by the numbers of seismicity is very small but the impact is felt in the area of the fault line is huge, because the fault line is close to the area of

settlements so that in the event of an earthquake can have a direct impact on buildings which is above the fault lines.

Earthquakes are sourced from active faults on land potentially damaging though magnitude is not too large, but the depth is shallow and close to the settlement as well as the activities of the (Malik, 2010). By doing so, the scale of magnitude not too big earthquake could be potentially damaging. Potential disaster is actually a dent in the fracture can be minimized through human efforts in disaster mitigation activities. Efforts in minimizing the earthquake can be both structural and non-structural. Attempts to minimize such disasters can be disseminated through disaster education.

Japan is one of countries that have a high intensity of the earthquake. Japan has the geological conditions are almost the same as Indonesia, is located on the two plates meeting the world is meeting the Pacific plate and the plates Sirkum Sirkum Mediterranean. This causes the vulnerability of Japan to the earthquake. In coping with disaster, Japan has implemented ways to minimize disaster victims through disaster education, especially in primary schools, junior high schools and high schools. Disaster mitigation education has been implemented into the curriculum of disaster. Disaster education has been implemented by the State of Japan according to Nakamura (2007), namely Video for disaster risk education, Instruction based on manuals, lesson and experiment by experts of disaster prevention, Earthquake experience by utilizing special cars, Drill for disaster prevention, Student's activities, First aid in time of disaster.



Figure 1 Activities of children of primary school and secondary school

Source: Fujimoto, 2008 (a) and Shimbun, 2009 (b)

Activities of children of primary school and secondary school in the face of the earthquake. Children were learning about how to evacuate casualties if a disaster occurs (Figure a) and kids in Japan are given simulated disaster by disaster experts and teachers at his school (Figure b).

Accordance with Law No. 24 of 2007 Article 26, which explains that every person has the right to social protection and safety, especially for children who are in areas prone to geological disasters and children are entitled to education/training/skills in disaster management. A sum of 43.7% children who are in the Bandung Metropolitan Area Indonesia do not know and understand the North Bandung area as an area that is prone to earthquakes. The

main cause of children do not know and understand the area is prone areas due to the way teachers provide disaster education is restricted to the textbooks. Therefore earthquake preparedness is needed, especially for school children who do not know how to deal earthquake. Based on that, this article will explain how to apply the learning preparedness efforts in children of school age in the face of the devastating earthquake which at times will occur as a result of this Lembang fault.

2. LEARNING DISASTER MITIGATION

2.1 Learning Definition

Laws of Republic Indonesia Number 20 in 2003 on National Education System states that the national education serves to develop the ability and character development and civilization of the nation's dignity in the context of the intellectual life of the nation. Education has a very important role for the development of a nation. Education is an interaction between educators with learners to achieve educational goals that took place in a particular environment (Syaodih Sukmadinata, 2005). In contrast to other experts who claim that education is a set of systems that contain a number of components of learning such as teaching materials, teachers, learners, methods, media, infrastructure and tools that support and policy decision makers in the world pendidikan (stackholders) at both the micro and macro (Maryani, 2007). It can be concluded that education is the interaction in a system and have a variety of learning interrelated components in order to develop the potential of learners so that learners are able to face and solve the problems of life that it faces. Learning components can be seen in the following chart.

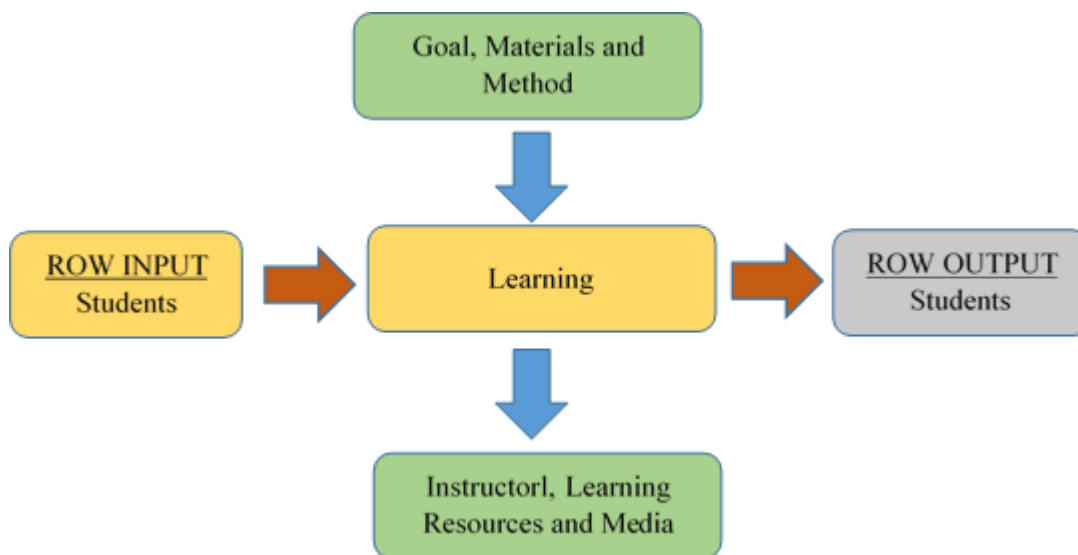


Figure 2 Relationship between the Learning component in the education process

Source: Hamalik, 2010

Education related to the teaching and learning process. However, there is a difference between the terms teaching and learning. Learning is a process attempts individual consciously to achieve a

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change certain behavior either observed directly as experience in its interaction with the environment (Suprihatiningrum, 2013) while learning is a conscious effort of teachers to assist learners so that they can learn according to their needs and interest (Cahyo, 2013). The conclusion that learning is a process of change in behavior of children identified from the changes in knowledge, understanding, skills and new habits while learning to be an attempt in a series of activities planned by the teacher to facilitate the children carry out the learning process in order to achieve the learning objectives effectively and efficient.

The children's learning is not only limited to the knowledge of the material only, but children can make the learning process based on the neighborhood. Based learning environment is needed in introducing the environment around the child, especially the environment are in disaster-prone areas. For example, teaching children in disaster-prone areas will be different with children who are in areas that are not prone to disasters. Applied learning in disaster-prone areas must be applied through the study of disaster mitigation. Disaster mitigation is defined as a series of attempts to reduce the risk of disaster, either through physical development as well as awareness and increase capacity in the face of disaster (Law of Republic Indonesia No. 24 in 2007). The main purpose of disaster mitigation, namely in order to reduce risk to the reduced number of casualties, economic losses and increase public awareness in the face of disaster.

Disaster mitigation learning is applied learning by teachers with the aim to reduce the number of casualties and losses caused by the disaster. Learning through disaster mitigation, indirectly into preventive efforts in building a child in the face of disaster preparedness. Learning suitable mitigation implemented in regions or countries that are prone to disasters, especially earthquakes.

2.2 Disaster Preparedness Concept

Preparedness is the knowledge and capacities developed by governments, professional institutions in the field of response and recovery, as well as communities and individuals to anticipate, respond to and recover effectively from the effects of events or conditions hazards that may exist, there will soon be or when the this last (UN/ISDR, 2009). Disaster preparedness is a preventive measure in anticipation of disaster. Disaster-prone areas should have a high preparedness if in any time the disaster occurred. Disaster preparedness ready condition characterized by whether or not a child in the face of disaster. Therefore, in training preparedness of children, the role of educators, especially education stakeholders so that in addition to the child know the kind of disaster-prone around the environment, children are also skilled in the face of disaster. This was confirmed by (UNDP/UNDRO, 1992) which states that preparedness is aimed at minimizing any adverse effects by way of precaution through preventive actions. The purpose of minimizing disasters is to reduce the threat and mitigate the impact of the disaster.

2.3 Parameter of Disaster Preparedness

Measurements on ready or not in the face of disaster can be measured by several parameters disaster preparedness. These parameters can be seen in the following table.

Tabel 1 Parameter of Disaster Preparedness

<i>Parameter</i>	<i>Indicators</i>
Knowledge	The availability of knowledge about the hazard (danger, hazards, and the magnitude of the danger), vulnerability, risk, and efforts to reduce the risk of such disasters.
Policy and Guidelines	Policies and guidelines set in the form of regulations such as decree and local regulation, regarding school rules that support disaster risk reduction efforts.
Emergency Response Plan	Activities undertaken immediately when a disaster occurs. Also associated with school evacuation maps, relief and rescue performed by each individual.
Disaster Warning System	Associated with simulation exercises and what to do if you hear a warning when a disaster occurs.
Mobilization of Resources	Related to building safer from disasters, improvement of individual skills in the face of disaster and the availability of the team on duty for emergencies.

Source: Widyatun, dkk (LIPI, 2008)

Measurement of preparedness in the school community can use index analysis. Analysis calculated index of each parameter and then given a symbol consisting of knowledge (KAP), an emergency response plan (RTD), disaster warning (PB), and resource mobilization (MSD). In the table parameter disaster preparedness mentioned five parameters to be calculated, but specifically for education stakeholders (community school) policy parameters and guidelines not included in the calculation because of the policies and guidelines are falsifies parameter in determining whether or not prepared for disasters. Then the parameters that can be calculated only consist of four parameters only.

3. METHODOLOGY

Methods used to increase preparedness student in learning disaster mitigation can use method field studies. Learning with the methods field studies is learning did as teachers by means of call school tuition learn outside the classroom to see the directly in the field use as a source of learning (Rasmilah, 2013). In this method, they invited to outside the class to directly see Fault Lembang phenomenon. This method is right application learning in area that disaster prone. For it, this method need plan that is ripe and steps systematic designed by educator who concerned. Ways of working method a field studies can has led to disaster preparedness the student gets seen in chart the following.

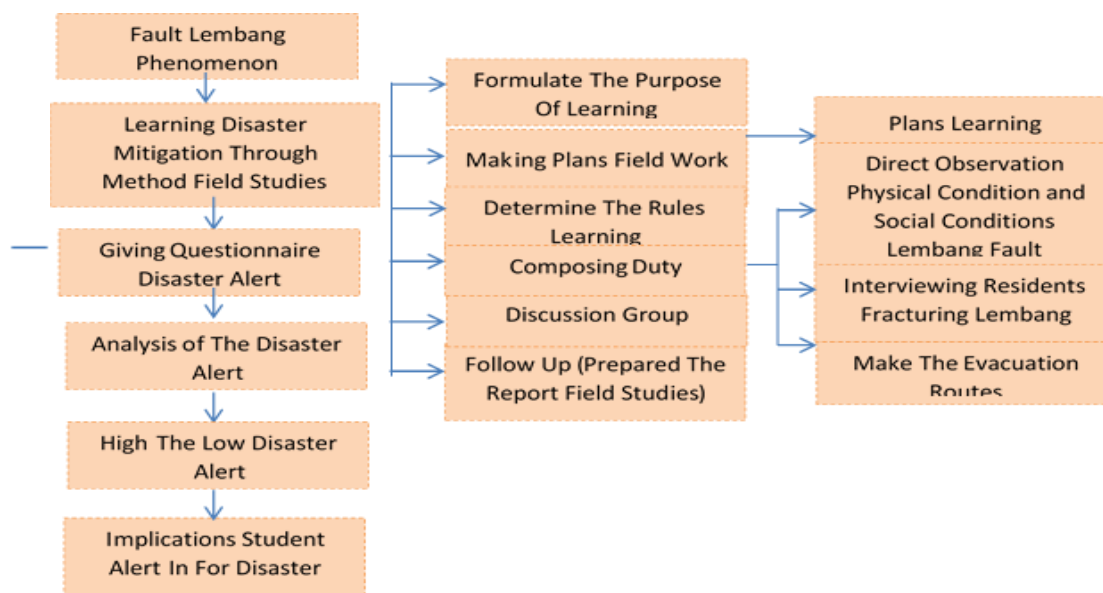


Figure 3 The Application Of The Field Studies

In learning disaster mitigation through method field studies have to take parameter and indicator to measuring alert students in Metropolitan Bandung Raya Indonesia, parameter and indicator it can be seen in table the following.

Table 2 Disaster Alert Parameter and Indicator

Variable	Parameter	Indicator
Students Alert	1. Knowledge	1. Danger of disaster 2. Type of disasters 3. Source of disaster 4. Quantities of disaster 5. Susceptibility of disaster 6. Risk of disaster 7. The effort to reduce the risks
	2. Emergency Response Plans	1. Activities quickly at the time of the disaster happens 2. Maps or evacuation routes school 3. Help and rescue done by individuals
	3. Disaster Warning System	1. Early warning disaster who use local knowledge 2. Concerned with training and simulation
	4. Mobilization Resources	1. Concerned with buildings that secure against disaster 2. An increase skill individual in handling disaster

Source : Widyatun, dkk (LIPI, 2008)

After determine parameter to be measured, it was made using analysis index disaster alert. The determination of index value for each parameter calculated based on the formula :

$$\text{Index} = \frac{\text{The real score parameter}}{\text{The maximum score parameter}} \times 100 \quad (\text{Sumber : Widyatun, dkk, LIPI, 2008})$$

It has been calculated score index, then score produced by any children adjusted on the basis of alert classifications index in place. Classifications index disaster alert seen in table below.

The Table Of Classifications Index Disaster Alert

No	Index Value	Category
1.	80 – 100	Quite Ready
2.	65 – 79	Ready
3.	55 – 64	Almost Ready
4.	40 – 54	Less Ready
5.	Less than 40	Not Ready

Source : Widyatun, dkk (LIPI, 2008)

4. RESULTS AND ANALYSIS

4.1 Results

Based on the result of the findings, learning disaster mitigation through a method of field studies can increase disaster alert children in the Metropolitan Area Bandung Raya, Indonesia. To know disaster alert required filling questionnaire of disaster that before and after conducted learning . This evidenced by the results of the processing analysis an index of some parameter as follows:

**Table 3 Index Analysis Earthquake Disaster Alert
In Metropolitan Bandung Raya Indonesia**

Parameter	The Score Before Learning	Category	The Score After Learning	Category
Knowledge	68,25	Ready	86,96	Quite Ready
Emergency Response Plans	60,93	Almost Ready	69,62	Ready
Disaster Warning System	60,93	Almost Ready	87,5	Quite Ready
Mobilization Resources	64,84	Ready	73,90	Ready

The table shows analysis alert index the earthquake in Metropolitan Bandung Raya Indonesia. We can conclude that on the parameter knowledge before learning still at the ready for

disaster in the knowledge, some student understood and examine the potential disasters around the environment. But, through learning disaster mitigation experienced distinction score to be at the level of are quite ready.

Parameter emergency response plans prior to learning be at the level of almost ready, it means the level of almost ready signifying there is a lack of knowledge about what should be done in times of disasters an earthquake because some student do not understand and know anticipation done by if disasters, this is proven by the percentage 46,9 % the student said panic if an earthquake occurred when they are in school and at home, 62,5 % they said occurred when earthquakes they go directly return to the classrooms or into the house of without considering aftershocks will reenacted, 65,6 % they will take cover under the table but if there is a chance to run then they will ran out class if be in the school and outward house, 93,8 % they say that if of disasters an earthquake the first thing they will come up with is valuables as cell phone, laptop, and jewelry. Through learning disaster mitigation start increased score and is at the level of be ready for the earthquake with the percentage 100 % student said not going to run out of the class but will find a safe place for example hiding under the table made of teak not to crammed into down the stairs emergency, 94 % they will not panic when a disaster occurs earthquake, 91 % they said it will secure importance document as raport and the certificate if earthquake.

Parameter disaster warning system show category almost ready, because student not know of the warning system in traditional disaster and through government policy. Having given learning they know an early warning system in the earthquake traditionally. Parameter resources mobilization associated with a secure against earthquake and increased skill individually in handling disaster (disaster simulated).

Before it was given learning, on the parameter this, student be at the ready concerning disaster, but they did not know fully gets into a building in accordance with prone to disasters and also have not follow disaster simulation or skill individually in handling disaster. Having given learning, they understand that means people adaptation around Lembang Fault can be done by structural business is to build the earthquake made of wood. In addition, they have been exposed to institution disaster management as Institution Tackling Disaster Province in the region.

4.2 Analysis

A method of field studies can increase disaster alert for student in the Metropolitan Area Bandung Raya Indonesia. The use of a method of field studies can developed by educators as the preventive efforts in through the effort to minimize disaster in non structural. By using the method field studies, the student can do the activities in outside the class as activity observe, identify, analyze object directly and real. A method it is totally suitable for applied in the area which disaster prone as through a method of the field student can comprehend the danger darkness of the environment directly so motivate them to ready earthquakes disaster. Analysis on every parameter in disaster alert can be seen in table the following

Table 4 Analysis of Parameter Disaster Alert

<i>No</i>	<i>Parameter Disaster Alert</i>	<i>Analysis</i>	<i>Recommendation</i>
1.	Knowledge	Knowledge some the student is weak about the dangers of disaster and potential earthquake disaster in around the environment	<p>a. Student given the introduction of the earthquake through picture of incident disaster, video of incident disaster, counseling directly disaster from local governments and introduction of the environment through visits directly to the disaster prone</p> <p>b. Local government should provide information to a community schools about maps of the area prone disaster</p>
2.	Emergency Response Plans	Student still having less knowledge about ways face earthquake disaster	<p>a. Student guided by teachers or local institution about first aid and rescue to be done by individuals</p> <p>b. Student given book guidelines on ways face earthquakes</p> <p>c. In the schools should be making a map evacuation routes and guides evacuation routes case of the earthquake</p>
3.	Disaster Warning System	All student do not know an early warning system to the earthquake disaster	<p>a. Student given guidance on ways to face earthquakes through disaster simulation</p> <p>b. Student need to understand on the utilization of the local wisdom on regions that disaster prone for example by using as an instrument drum as early warning</p>

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No	Parameter Disaster Alert	Analysis	Recommendation
4.	Mobilization Resources	<p>a. All student do not aware of building earthquake resistant</p> <p>b. Student not knowing a institutions or agencies of the earthquake disaster</p>	<p>system</p> <p>a. Student guided by teachers to know house of customary as a house earthquake, as gadang traditional house, rumoh aceh, etc</p> <p>b. The school visit to agencies or institution like BNPB around local area</p> <p>c. The schools bring speakers to provide counseling handling of the earthquake</p>

5. CONCLUSION

Disaster mitigation learning through a method of field studies can improve disaster alert for student in Metropolitan Bandung Raya Indonesia. This is in accordance with the results of the findings that show the change in the index score when the before and after learning through applied a method of field studies. Besides this method suitable applied in the areas identified disaster prone, this method has an excess of another for student. Excess this method namely they can observe, identify, analyzing objects directly and real, so that they gain experience of learning. Experience learning these which could then be provisions for the future.

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BIOGRAPHICAL NOTES

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