

Implementations of Science Curriculum Models for Elementary Schools with Integration Mitigation and Disaster Management for Students At Coastal Area of East Java

Eko Hariyono*), Abadi), Layli Rosdiana***)**

**)Physics Department, Mathematics and Natural Science Faculty, Surabaya State University*

**)hari_fisika@yahoo.com*

Abstract

The curriculum developed in this research is a science curriculum models that integration between technique and responsiveness of disaster mitigation that can be applied in science learning for elementary students in East Java coastal areas highly vulnerable to disaster issues. Science curriculum model was developed in accordance with the existing potential disasters in coastal areas of East Java. The study involved 60 primary school teachers from three districts in the coastal region of East Java, Banyuwangi, Trenggalek and Pacitan to provide an assessment of the model curriculum developed and 3 schools were used as a test implementation of the curriculum SDN 9 Tegalharjo Banyuwangi, SDN 3 Watugunung Trenggalek, and SDN 3 Pacitan in Pacitan. From the results of the assessment carried out by the teacher, it can be seen that the model is very appropriate to the needs of teachers to teach science material in accordance with the disaster problems that occur in the coastal areas of East Java. The result of a teacher questionnaire showed that the response of teachers to the curriculum were very positive. The student learning outcomes of disaster knowledge showed a significant increase between the pre test and post test. Students have a good knowledge about mitigation technique and disaster responsiveness, they can describes potential disasters also mention what kind of activities that lead to disaster in the coastal area.

Keywords: Integrated Science Curriculum, Mitigation Technique, Disaster Management

I. Introduction

Indonesia very closed with disaster. There have been many disasters in Indonesia. The National Emergency Agency (NEA) or Badan Nasional Penanggulangan Bencana (BNPB) reported there were 238 disaster events on 2014, consisting of flooding, landslide, typhoon, flooding with landslide, forest fire, and earthquake in measuring greater than five on the Richter scale. This condition caused a total of 174 of deaths, at least and 5127 homes were damaged. Majority caused by flooding especially in Jakarta and surrounding urban area (OCHA: 2014).

This condition is so vulnerable enough to give an overview of the potential catastrophic condition of the people in this country. Local and national governments, international institutions and non-government organizations pay attention to educate people to be more aware of disaster and become prepare when disaster occurs (Adiyoso, W & Kanegae H, 2012). There government bodies began to give serious attention to the problem of disaster and established disaster management centers in areas that are expected to provide services to the public related to disaster problems that often occur. This step is considered very effective in order to equip the people especially those living in disaster areas.

Communication Ministry of Indonesia or Depkominfo (2009) reported there are some problems about consciousness attitude disasters in coastal areas, such as the lack of knowledge about disaster, the level of economic, social and culture. Actually, the coastal people know that disasters is damage but unbeaten with an attitude of maintaining the family's economic circumstances. According them, the disaster was a blessing for some people because it will get support from other parties.

Panic, M et.al (2013) reported that disaster education not only give information but should guide students to understanding about disaster problems, disaster awareness, and disaster response. In order to raise consciousness toward disaster response education should start early. It required an appropriate educational process, so it requires a mechanism that integrates educational disaster responsiveness in learning activities with the expectation that students have a good preparedness about a potential disaster in the region. "Preparedness has become a common term used in

terms of home land security and disaster planning documentation" (Preston.,J, 2012:2).

East Java has the potential for disaster is huge and diverse, such as typhoon, floods, landslides, earthquakes, tsunamis, and many other disasters. That everything should be well recognized by students related to how to minimize risk in events of a disaster and make decisions when getting an early sign of disaster. In this case, to be required a disaster curriculum that appropriate with coast condition. This study focused to measure teacher's understanding about disaster curriculum, students knowledge and skill disaster preparedness.

II. Disaster Education in Learning Science

Panic' et al (2013) reported the disaster awareness in education is important to minimize of risk. Education should increase student's competency and knowledge that will apply if disaster occurs (Mutarak, R & W. Pothisiri, 2013). Processes and mechanisms required systematic and carried out responsibly. To achieve this goal, schools as an educational institution must cultivate an attitude of disaster awareness to learners seriously.

Ronan K.R, & Johnston, D., in Adiyoso, W & Kanegae H, (2012) reported that the disaster education programs has priority to change students preparedness attitude and then children's knowledge, critical awareness and risk perception. In addition, Unesco (2007) give a guide line for disaster education system. A purpose from this program is students can improve their chance of surviving disaster if they understand about disaster and students have good decision if the disasters occurs.

Disaster education is important for students who live in coastal area. Integration with science is feasible. Science curriculum for elementary school in Indonesia has some contents to prepare students for understanding about environment and disaster. The science curriculum has emphasizes to hands-on experience through practical activities. It can develop competence among students with multiple objectives, knowledge and science concepts that are useful in everyday life as well as to develop the skills, to investigate the nature around, and solve his problems (Depdikbud, 2008).

Smith, M.U & Harvey, S (2004) reported that the primarily purposes of science education learning is students should be have knowledge and

understanding in science. Students have good participation and teachers have a good appreciation (Sandra K.A, Ken A, Deborah L.H, 2010).

The science curriculum has purpose to provide direct experience to express some ideas and demonstrating science skill to students. Martin R in Howe (1993) gives definition about science, "Science is not just collection of laws, a catalogue of unrelated facts. It is creations of the human mind with its freely invented ideas and concepts". Nancy, P and Margery, M to describes about science, it is an observations about what happen, try to observe with commonsense, using new knowledge for make prediction about something will be done, and proofing truly from a prediction (Carin:1993). Boleman (1955) expressing, that modern scientist not only received a hypothesis or theory just like that, but confirmation is needed. This is important to evidence of theories. Students must engage in science process so that they have not different perceptions about concept that can lead to misconceptions. Science is specific knowledge that assess about nature through scientific stage and scientific attitudes.

III. The Development of Disaster Curriculum Model

To be able to properly carry out of education disaster, required a school curriculum and implemented seriously. Especially for schools in coastal area of East Java average is proneness. There was a significant effect of curriculum based disaster education program on the combined dependent variables such as school children's knowledge, risk perceptions, critical awareness, individual preparedness and school preparedness (Adiyoso, W & Kanegae H, (2012). The curriculum was developed to be able to access the local issues that will have a positive impact on the growth and development of learners.

Marsh, JC, (2004) said, "Curriculum is all learning planned for which the school is responsible". The concept of the curriculum according to the government statement as stipulated in government regulation. The curriculum is a set of plans and arrangements regarding the purpose, content, and teaching materials and methods used to guide the organization of learning activities to achieve specific educational goals. One of the materials can be integrated with the science curriculum related to disaster problems that arise in the coastal region of East Java.

The sciences of curriculums education in accordance with the problems that arise in coastal areas need careful planning. Activities to identify problems that will be a major review of the curriculum is necessary. Tyler, R express about elements underlying the development of curriculum that is presented in the form of questions, consist of: (1) *What educational purposes should the school seek attain?* (2) *How can educational experiences be provided that are likely to achieve that purposes?*, (3) *How can these experiences be effectively organized,* (4) *How can we determine whether these purposes are being attained?* (Kemp., JE,1997),

The questions above lead to what goals will be formulated in the curriculum, how the learning process is implemented to achieve these objectives, and how to measure the achievement of these goals. Each curriculum should be based on the principle of the best (excellence) so that each student can achieve the best for themselves and their environment. Student must hold the appropriate standards with good ability on the moral aspects, ethics, knowledge, or other aspects. Given that every student has the aptitude, interest and motivation are different, then the difference should also be considered so that the status of the specified quality standards for all (Depdikbud:2008).

The elementary science curriculum development that was first to be done is the analysis of the needs of the schools. For schools in coastal areas have different needs compared to other schools. How to prepare students to be aware of the disaster is an important priority in teaching material science. Identify problems and potential environmental and potential disasters that appear in the coastal environment is used as a basis to formulating science learning objectives should be oriented on mitigation techniques and disaster responsiveness by considering the school conditions.

Design curriculum is prepare in accordance with the provisions of the National Education Standards include objectives, content, methods, organization, and assessment. The purpose of the curriculum is formulated in accordance with the rules of national education goals and in accordance with the needs of problem-oriented school disaster in the coastal region of East Java. Curriculum content includes knowledge about the disaster, the skills to know about the signs of nature, skill in applying mitigation techniques and integrated

disaster responsiveness in science curriculum. Figure 1, show the process of curriculum implemented and disseminated.

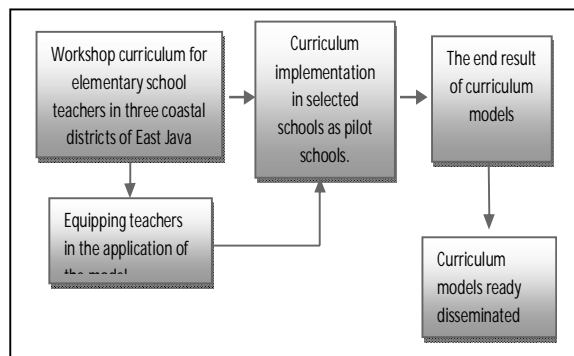


Figure 1. The process of curriculum implementations and disseminations

Associated methods with the stages of implementation of the curriculum that can be implemented in schools in the achievement of educational goals as outlined in the curriculum. Organizing curriculum describes how the role of teachers and principals in implementing a curriculum that has been developed and implemented an evaluation to determine how the curriculum can be achieved effectiveness.

IV. Methodology

The focus of this research is the implementation of a model science curriculum education that integrates mitigations technique and responsiveness of disaster mitigation at primary school students in the coastal area of East Java. The research involve of 60 primary teachers in the coastal region of East Java. There are three districts were chosen as a test site, Banyuwangi, Trenggalek and Pacitan. These districts are considered to have great potential disasters and disaster conscious attitude of the public school quite low. Each district is represented 20 teachers are expected to be delivered to teachers and other school teachers through discussion forums.

In this research, that have fourth important point will measure, such as:

- The result of teacher worthiness assessment of science curriculum models developed.
- Skills to applying science curriculum model.
- Teacher responds to science curriculum model.
- Student result after following learning process with science curriculum model.

- Some constraints in science curriculum model applications.

Some instrument used in this research, such as: questioner sheet, observations sheet, pre test and post test instrument for pilot schools students.

This research used qualitative and quantitative approach. Qualitative approach used for suitability of science curriculum models with disaster and the constraints of science curriculum models applications. Quantitative approach use for describes students understanding about disaster in learning science.

V. Results

Teacher worthiness assessment should measure from some component, such as: suitability indicators and learning purpose, suitability learning activity and basic competency, the integration between cognitive, affective, and psychomotor in the curriculum model, content analysis and organizing materials, suitability assessing technique in curriculum model, learning models in curriculum and applying curriculum model in coastal area. Figure 2, showed about assessing worthiness from almost to disaster curriculum.

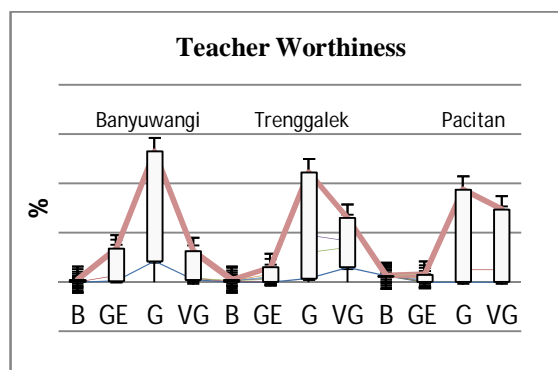


Figure 2. Teacher worthiness

Resource: The primer data from National Research Strategic about Science Education Curriculum for elementary school at coastal area East Java 2nd year.

From all data above, the result of teacher worthiness assessment about curriculum disaster in three regions is good average. Almost teacher have a good appreciations to disaster curriculum models.

Figure 3,4 and 5 showed learning results of student about disaster curriculum implementation in the 3 pilot schools. Overview of learning result can be seen in figure below.

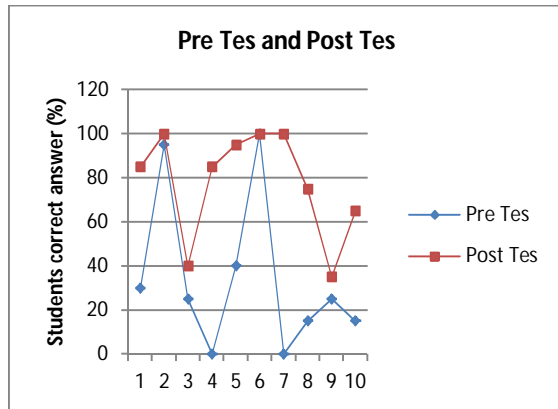


Figure 3. Pre test-post test data from SDN 3 Tegalharjo Banyuwangi.

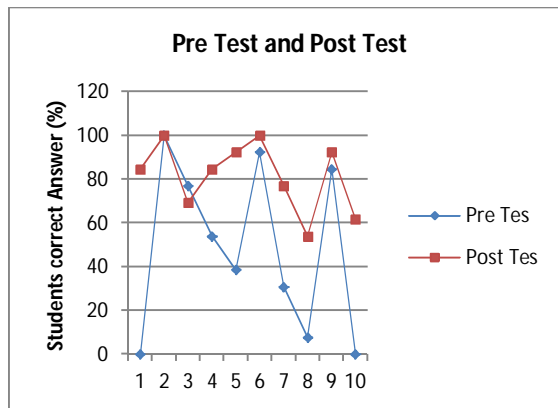


Figure 4. Students Pre Test-Post Test data from SDN Watugunung Trenggalek

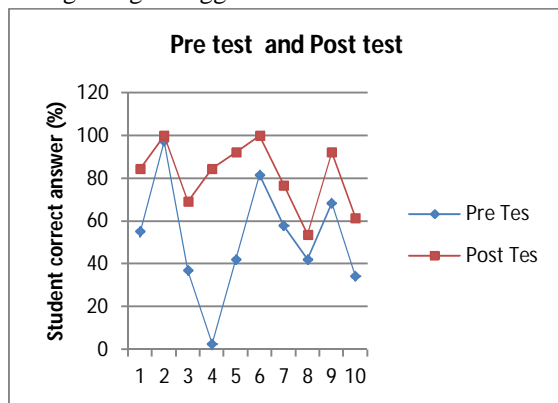


Figure 5. Pre Test-Post Test data from SDN 3 Pacitan.

Disaster responsiveness taught relatively more difficult than the knowledge of the disaster. In the attitude of learning required a process of habituation. However, in this study assessed attitudes based on students' answers related to what to do after finding early signs of disaster. Here is presented the students' answers related to the type

of disaster, an early sign of disaster and disaster responsiveness:

Table 1. Understanding students about early signs

No	Types of disaster	Early signs	Attitude / actions undertaken
1.	Flooding	Heavy rain, continuous rain, the water began to overflow	Put important documents in a higher place
2.	Tsunami	The earthquake and the tide is low, see birds flying	Go to higher ground, immediately evacuate to a safe place.
3.	Earthquake	Ground to vibrate, there was a roar	Take cover under a table made of wood, use a helmet, took refuge in a corner of the building.
4.	Volcanic eruption	Animals in the mountains down to the surrounding villages.	Running towards a place of refuge
5.	Erosion	A voice rumbled, fragile rock, gravel began to fall, murky water wells around the slopes, the appearance of cracks in the direction parallel to the slope of the cliff.	Immediately evacuate

IV. Findings and Discussion

The model curriculum is implemented to get a positive response from teachers in the coastal region of East Java. This provides opportunities associated with the expected development of science curriculum according to the needs of learning science in the coastal region of East Java, which is considered very vulnerable to disasters. In general, the assessment of teachers in Banyuwangi, Trenggalek and Pacitan stated that the curriculum model developed considered feasible and appropriate to be applied in the region. Associated with content selection and organization of material with material disaster, 5% stated quite appropriate, 40% stated accordingly, and 55% said very appropriate. About the suitability of the learning models used in teaching materials science techniques that integrate mitigation and disaster responsiveness, 25% stated they were quite

appropriate, 70% stated accordingly, and 5% said very appropriate. Associated with adherence to the elementary science curriculum for the coastal region of East Java, 5% less than the corresponding states, 15% is quite appropriate, corresponding to 60%, and 20% are very appropriate. This means that teachers can implement optimistic for the curriculum model well.

While related to the conformity of a model curriculum with disaster issues in the district of Banyuwangi, Trenggalek and Pacitan, 5% less than the corresponding states, 10% is quite appropriate, the corresponding 60% and 25% said they had very appropriate. There are some records that conveyed by the teacher related to the improvement of a model curriculum that integrates science and responsiveness of disaster mitigation for elementary students in the coastal area of East Java.

Student learning outcomes mean well, generally based on the above data the students already have a good knowledge of the material mitigation and disaster responsiveness, all students (100%) should mention of the potential for disaster in their area and also students are able to mention the activities of the public good catastrophic in the area around the student. The problem is still not well understood is about the introduction of the early signs of disaster, the surface appearance changes caused by the disaster, evacuation routes and benefits as well as rescue actions during an earthquake.

The curriculum must be dynamic to follow the development of the key problems in the neighborhood. In the school curriculum with more emphasis to shape the learning experience for students in order to achieve educational goals. As presented by Dr. Cheng Hon-Kwan in his message as chair of the curriculum developer in Hong Kong-China,

“....., it is not enough to impart them with mere ‘knowledge’ . Instead, we have to help them develop a global outlooks, equip them with a repertoire of skills and the positive attitudes to respect knowledge and to learn how to learn” (Hongkong Special Administrative Region of RRC. 2000).

In the curriculum just is not enough emphasis on knowledge, but should be able to help students so knowledgeable and equip students with the skills and positive attitude that respect for knowledge and learning how to learn.

Often departing from the learning process instead of the teacher and the student. There is an impression that the implemented learning because teachers who want not because of an attempt to answer the curiosity of students resulting in a "coercive" less meaningful. Lessons will not be worth anything if it only relies on knowledge alone. Gutek, GL states within one point of the definition of education.

The act or process of providing a person with the knowledge, skill, competence, or usually desirable qualities of behavior or character by a formal course of study, instruction, or training. (Gutek, GL:2004).

Based on the sentence above can be seen one indicator of success is the achievement of quality education or character behavior through a formal education about learning, learning and training.

VI. Conclusions

Based on the research results related to the implementation model of elementary science curriculum that integrates engineering disaster mitigation and responsiveness to students in the coastal areas of East Java conclusions can be formulated as follows:

- (1) Teacher assessment in 3 districts associated with a model curriculum that integrates science and responsiveness of disaster mitigation is considered feasible applied coastal region of East Java and in accordance with the needs of schools in the coastal areas of East Java.
- (2) Skills of teachers in implementing a model curriculum that integrates engineering science and responsiveness of disaster mitigation rated average to good.
- (3) Response of teachers to the curriculum model developed very well, it is shown from the results of the questionnaires filled by teachers on average judge agreed and strongly agreed.
- (4) Results of the average student learning both general Based on the above data the students already have a good knowledge of engineering materials mitigation and disaster responsiveness, all students (100%) to mention the potential for disaster in their area and students can also mention the well community activities that lead to disaster in the area around the student are not well understood about the

introduction of the early signs of disaster, the surface appearance changes caused by the disaster, evacuation routes and benefits as well as rescue actions during an earthquake.

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