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Constructing Volcanic Hazard Video Toward Student Comprehension of Kelud Volcano Disaster Prone Area And Its Environment Characteristics

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Abstract. This paper aim to presents several procedural process to develop learning material toward volcanic disaster with case study Kelud Volcano in East Java. Last eruption of Kelud volcano occurred on 13th February 2014. This eruption phase has a big impact in large area especially in disaster prone area in Blitar, Kediri, and Malang. Volcanic pyroclastic material and lahar became serious hazardous problem. Some people who live in disaster area actually have not any experience coupling with volcanic disaster. In volcanic disaster management one most important thing is preparing people to reduce disaster risk. To achieve this purpose people especially student need to understand or have comprehension toward hazard, vulnerability, and risk of Kelud Volcano. Hence, need an effective media to reach student comprehension by using video. The video was developed by using design and development research. This video present series of Kelud volcanic hazard, vulnerability, people capacity to reduce disaster risk. The video is used to student in the senior high school. The result of using could increasing students understanding/comprehension toward Kelud volcano its environmental characteristics, hazard, vulnerability, and how to enhance people capacity toward disaster risk reduction. The final finding shows that learning material in form of video is used full to increasing student knowledge, comprehension, and capacity in the efforts of disaster risk reduction.

1. Introduction

Indonesia lies among 129 active volcanoes in the world. These condition has consequences due to a large of volcanic hazards that widespread in Indonesia. Kelud Volcano is one of an active volcano in East Java Province, Indonesia. This volcano types belong to Stratovolcano. The Stratovolcano has explosive eruption characteristics.

Kelud Volcano Eruption in 2014 had a serious damage and loss impacts in several disaster-prone areas. Damage to residents' settlements, paralysis of the agricultural industry, airport closure, and damage to various public facilities is a clear example of the losses experienced during the eruption period. On the other hand, eruption events have several positive influence on the paradigm shift of thinking and acting on the threat of eruption of the Kelud Volcano [1]

Disaster risk reduction education for high school students who are vulnerable to volcanic disasters has not fully accommodated students' learning needs. In general, disaster education in high school had



limited resources that explain the environmental conditions of the student's residence and surroundings. The characteristics of hazard threats should be understood by students in a disaster-prone area.

As an ongoing education and learning effort a model in disaster risk reduction education (DRRE) has been widely developed. [2] describes several concepts, namely: disaster risk reduction education (DRRE), education for sustainable development (ESD), climate change education (CCE) and environmental education (EE) which are carried out in various areas and contexts. The 2006 UNISDR campaigned for disaster risk reduction starting from school. This aims to propose integration between disaster risk reduction and the curriculum that is implemented in schools.

Based on the development of disaster risk reduction education trends and student learning needs in disaster-prone areas, the disaster material content should be contextually arranged with the actual conditions in the field. The development of learning design is expected bridging student learning need. Student learning need is a conditions of fully understood about surrounding environment.

Development of learning media for disaster risk reduction must be in line with the basic competencies that are applied in schools, especially in 11th grade of senior high school. Basic competencies in 11th grade of senior high school is suitable to develop of DRRE learning models. One kind of tool that develop in DRRE is video. In this case the video content are characteristic of geographical place/location; its potential hazard; people and their surrounding environment vulnerability; their capacity in order to reduce impact of disaster risk.

Nowadays, learning materials in disaster is currently limited and lack of appropriate learning media. Learning video media is a tool for presenting audio and visuals. This media contains concepts, principles, procedures, and application theory to help student understand their environment [3]. Learning media is helpful for direct information from teachers to students. This function are stimulate students' thoughts, feelings, attention, and interests. Learning process becomes more efficient after using learning media/video. Through good media visualization will make it easier for students to understand about 30% [4].

The learning about natural disasters, especially the eruption of Kelud Volcano, becomes very important. This is important because it can reduce the impact of casualties caused by the eruption of the Kelud Volcano. Students can carry out their own disaster mitigation activities by knowing the vulnerable areas of Kelud, characteristics of eruptions at Kelud Volcano, and disaster mitigation activities that can be carried out.

Geography learning is an attempt to create a learning process that can facilitate students to be able to understand geosphere phenomena, identify geosphere phenomena, and formulate and draw conclusions from a geosphere phenomenon. The geosphere phenomenon in question is a problem that occurs in the environment.

School is a learning institutions where students learn about cultural values, religious values, traditional-modern knowledge, including knowledge about disaster. According to John Dewey in Nasution explained the school as the most effective medium for reconstructing and improving society through education. Therefore, schools in disaster-prone areas must have sufficient preparedness to deal with natural disasters around them. Schools also have a role in improving students' preparedness in dealing with disasters. The purpose of disaster learning in schools is to build a culture of alertness and a safe culture in schools and build resilience in the face of disasters.

Urgency in studying disaster material is a constraint, such as limitations of learning media. Conceptual learning media is needed in daily learning. The available learning media currently using old media that is not contextual. The introduction of the characteristics of the region's environment prone to volcanic eruption and disaster risk reduction must be contained in the geography learning media. The availability of geography learning media about disaster risk is useful in students' understanding of the environment, and the risk of disaster. Kelud Volcano, and how to mitigate disasters that must be done if the eruption of the Kelud volcano is repeated. The availability of

learning media does not exist in schools makes students less aware of the characteristics of disasters in their environment.

The media is a link and tool for learning activities. Learning media is used as a tool to channel information from teachers to students and stimulate students' thoughts, feelings, attention, and interests so that the learning process becomes more efficient. By using the media, the teacher can present learning material in audio visual form such as moving pictures coupled with the writing and material presented seem more interesting. Thus the delivery of material by the teacher becomes easier. Especially in the basic competencies of disaster mitigation.

2. Method

The early stage of design and development learning materials based on national curriculum. The national curriculum on geography subject divided into several basic competencies. In the matter of disaster mitigation there is basic competencies in senior high school.

To achieve the goals of learning media development, Operational efforts are carried out with the development of design and development research [5]. In this design there are three stages including:

2.1 Learning Theory And Research;

The first stage of Learning Theory and Research is a stage of identification and analysis of student learning needs. Identification and analysis of needs are included disaster mitigation material. Disaster mitigation materials taught in high school are not contextual. Student learning needs should accommodate the characteristics of the disaster location. Learning material is not only disaster mitigation but also disaster risk reduction. In the material developed disaster risk reduction is aimed at reducing the risk of volcanic disasters.

2.2 Instructional and Instructional Design Theory and Research;

The second stage is based on developing basic competencies in schools. The operational stages include: (1) designing learning objectives, (2) introducing learning material content, (3) preparing learning media in accordance with learning material (in this case the media used is video), (4) preparing learning evaluations and assessments.

2.3 Communication Theory and Research

The third stage is the implementation of disaster risk reduction learning in the classroom. The implementation includes: the use of video media, evaluation aims to test students' understanding and to know the effectiveness of using video media.

The first stage of testing is used by evaluating through subjective tests. Subjective tests include: geographical characteristics of volcanic regions; history of volcanic eruptions; areas prone to volcanic disasters; factors that influence the risk of volcanic disasters; and efforts to reduce the risk of volcanic disasters. The second stage of effectiveness testing is done by the teacher and student responses.

Based on the first testing phase, quantitative data is obtained in the form of student scores. Whereas from the second stage the teacher and student responses obtained a qualitative description of the effectiveness of the development and application of video media.

3. Results and Discussion

The preparation of learning video media is based on the need for disaster risk reduction learning materials in high school. Material needs cover the breadth and depth of the material. The broad aspects of learning materials for disaster risk reduction include: Characteristics of Kelud Volcano, Disaster Prone Areas, Hazards of Kelud Volcanoes, Vulnerability, Risk, and Disaster Mitigation Efforts. While the depth aspect of the material is the detail of organizing the material that has been prepared previously.

The development of students' cognitive level becomes a reference in developing learning materials. The cognitive level of high school students will develop rapidly if supported by learning media that is appropriate to their age development. In addition to the cognitive aspects of learning videos must also

pay attention to the affective aspects of students. The affective aspects of students relate to the acceptance of students' attitudes in disaster risk reduction.

Learning videos cannot yet be used extensively before being tested. The test was used to determine the accuracy of the material presented in the video, the level of students' understanding, the response of students and teachers to the video. The test was conducted in schools located in Kelud Volcano eruption prone areas.

Experimental of videos carried out through the stages of delivering learning materials using learning videos. Totally 38 students were involved in video experimental learning product activities. First stage before use the video there is a pre-test. Pre test is used to determine the level of students' understanding of volcanic disasters. The questions given at the pre test are the same as the post test questions. The scope of the question includes: 1) Geographical characteristics of Kelud Volcano; 2) History of Kelud Volcano eruption; 3) Kelud Disaster Prone Areas; 4) Hazard, vulnerability and risk analysis of Kelud Volcano; 5) Efforts to reduce the risk of Kelud volcano eruption disaster.

The pre test results showed an average student score of 58 from a scale of 100. The average pre test score showed that students' knowledge of disaster risk was in sufficient classification. Classification of students level of knowledge regarding volcanic disaster material can be shown in Table 1 as follows:

Table 1. Classification of Students' Level of Knowledge in Volcanic Disaster Material

Range Score	Classification of Student Knowledge Level
0-20	Very limited knowledge
21-40	limited knowledge
41-60	Adequate knowledge
61-80	Well knowledge
81-100	Very well knowledge

The second stage of the Experimental was the delivery of learning material on the risk of Kelud volcano disaster using learning videos. Learning videos contain: 1) Type of Kelud volcano; 2) Types and characteristics of natural disasters; 3) Impact of Kelud Volcano eruption disaster; 4) Disaster management cycle; 5) Institutions/agencies that play a role in the disaster management of Kelud Volcano.

The third stage is the post test. The evaluation questions used in the post test are the same as the evaluation questions at the pre test. The post test results showed an increase in the average score of students which is equal to 73. This means there is a gain score of 15 points from the pre test.

The fourth stage is the response of students and teachers shown in the student and teacher response questionnaire. The indicators used in the student-teacher response questionnaire can be seen in Table 2.

Table 2. Student-Teacher Responds on Media

No	Variables of Student-Teacher Responds on Media	1	2	3	4	5
1	Appropriateness of learning material with its indicator					
2	Role of media in order to achieve student comprehension					
3	Appropriateness of learning context and indicator					
4	Material depth					
5	Appropriateness of learning and its environment					
6	Accuration of fact and data in learning material					
7	Appropriateness material content and context					
8	Clarity of learning material					
9	Appearance of materials systematics					
10	Level of student comprehension on learning material					
11	Role of media accordance to understand					
12	Role of pictures to enhance knowledge					
13	Role of task and assignment in increasing student comprehension					
14	Student curiosity toward learning material					

15 Level of learning material sophisticated

Remark:

Score 1 Very limited; 2 Limited; 3 Adequate; 4 Well; 5 Very Well

Weight 1.3

Minimum value 20; maximum value 100

As a final result Student-Teacher Responds on Media get score 90.62. It shown this media is valuable and can be used to volcanic disaster risk reduction learning material. Media video is suitable for a subject that describes a certain process, several phases of demonstration, and concepts related to everyday life. In the cognitive domain, students obtain information in the form of a real condition from the actual environmental conditions and processes that work in it. On the other hand, video media presents a real condition without students field observation.

Video development process should be consider on several lesson criteria. These criteria could be distinguish into several phases as follows:

1. Type of material

Selection of materials based on the complexity of the content that can be shown on the incidence of Kelud Volcano eruption. On the other hand, preparation of instructional video media useful as supplementary materials are not available in textbooks geography. So as well as students gain a real condition of the processes that occur on Kelud disaster prone area. Based on these explanations, it can be determined in lesson learning materials include:

- a. Type of Kelud volcano
- b. Types and characteristics of natural disasters
- c. Impact of Kelud Volcano eruption
- d. Disaster management cycle
- e. Institutions / agencies involved in disaster management Kelud Volcano

2. Video presentation format

Learning videos prioritize the presentation of clarity and breadth of material. Video formats that are suitable for learning disaster risk reduction include: narrative explanation, interview presentation and presenter monologue. In the design of this development use a combination format. The combined format chosen for the material characteristics disaster risk reduction can be optimally by using a variety of formats. Narrative format is used to describe the processes of volcano. Interview format used to describe the threat of volcano hazard and its impact. Presenter format used to describe the general conditions in the field [7].

3. Video duration

In the preparation of the video media to be effective when presented for 20-40 minutes. It is based on the ability in students memory and concentration skills. They have limitation in understanding material. Short video duration provides benefits compared to movies. Some materials capture from video can be shown as follows.



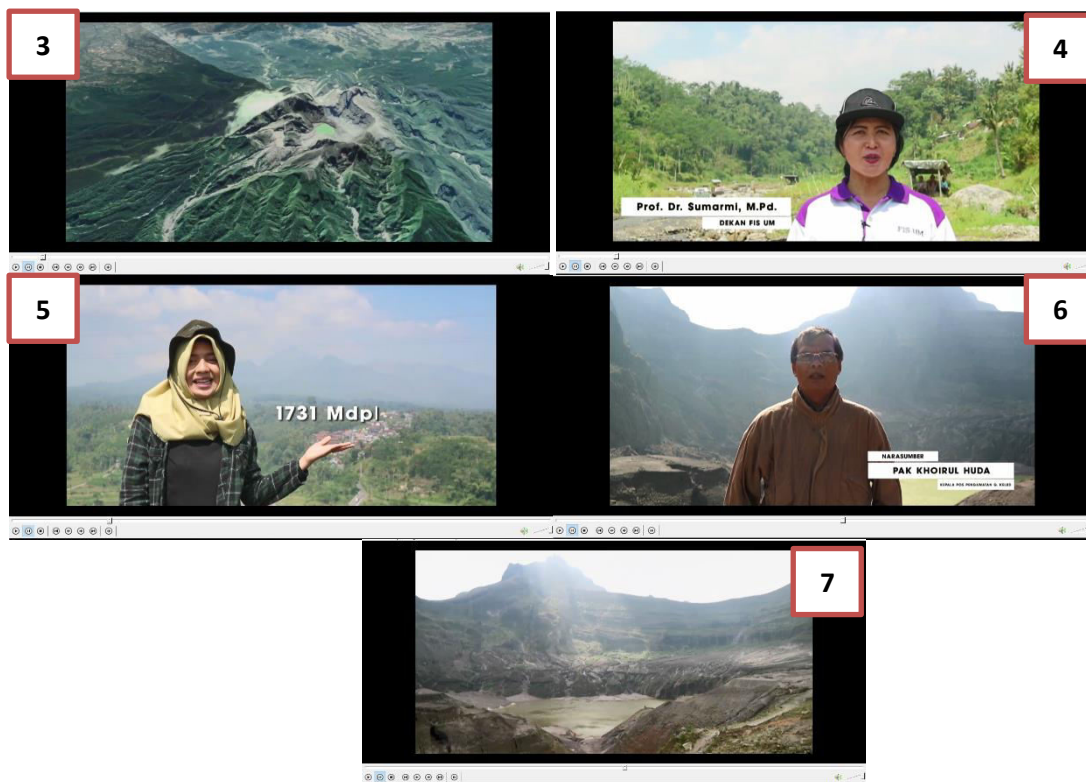


Figure 1. Video opening; **Figure 2.** Introduction of Learning Material on video; **Figure 3.** Aerial view Post Kelud Eruption on 2014; **Figure 4.** Opening speech; **Figure 5.** Opening speech by presenter; **Figure 6.** Kelud Volcanic Disaster Explanation by Head of Volcano Observation ; **Figure 7.** Crater Lanscape after 2014 eruption

4. Concluding Remarks

Video media is suitable for learning material that is describing a particular process, a demonstration plot, a concept or describing something. In the cognitive domain, students obtain information in the form of a real picture of the field conditions and processes. Video can present a real picture for students without doing field observations.

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