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Increasing Volcanic Eruption Disaster Mitigation Through Simulation Practice with Video Learning Media in Geography Education, University of Khairun

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Abstract

The volcanic eruption disaster is the most potential disaster in Ternate. When PVMBG published the press release on May, 3rd , 2023, it raised concerns for the society. Therefore, to built an awareness and information about volcanic eruption, it is necessary to give the knowledge from the school level to the university level. This research aims to analyze and describe the application of theory to disaster mitigation courses at Geography Education Study Program, University of Khairun. The method in this research is using a Pre-experimental Research with One Group Pretest-Posttest Design through of using video learning media. The result showed that the use of video learning media was able to increase students understanding of volcanic eruption disaster mitigation, and also increasing skill in practicing volcanic eruption disaster mitigation simulation.

Keywords: Disaster Mitigation, Simulation Practice, Video Learning Media

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1. Introduction

Disaster is an event or series of events that threaten and disrupt the lives and livelihoods of people caused both by natural and non-natural factors, resulting in casualties, environmental damage, losses and psychological impacts (Act No. 24 of 2007). To minimize the impacts of a disaster, there is a need to be an understanding of disaster mitigation. Disaster mitigation can be done both structurally and nonstructurally (Nursa'ban et al., 2010). One of the non-structural mitigation efforts is through reducing disaster risk through empowerment and providing good knowledge to the community (Nursyabani et al, 2020). In addition, nonstructural mitigation is also more sustainable because it is able to exert influence in the long term (Dewi and Istiadi, 2016).

North Maluku province has four active volcanoes spread across several districts and cities, there are Mount Gamalama in Ternate City, Mount Dukono in North Halmahera, Mount Gamkonora in West Halmahera and Mount Ibu in South Halmahera (Masinu et al, 2018). Ternate City is located circling Mount Gamalama which has three geomorphological units: mountain foot geomorphology and body geomorphology and

mountain peak (Firmansyah, 2011). As a city at the foot of Mount Gamalama, the potential impact of volcanic eruption to the people in Ternate City is quite high. This potential is enlarged because many residential settlements have reached the mountain body. In the 2011 eruption, eruption caused 3 people severe injuries, 29 houses were severely damaged and 29 houses were mildly damaged (Pradiptasari et al, 2015). In addition, various sectors in Ternate City were paralysis until the closure of airport operations (Ryan and Pratama, 2017).

As part of the community, students are expected to play a role in providing disaster knowledge to improve non-structural mitigation efforts, which one of using disaster mitigation training practices. Mitigation training practices should also be based on a qualified disaster theory. To help achieve this goal, there is a need for media in the learning process (Pangestu et al, 2021). Through the development of today's technology, learning media is increasingly variable and digital-based. The goal is to make the resulting learning media a form of utilization of technology in improving media processing skills (Suarsini et al, 2020). Among the many learning media using technology is video (Anshor et al, 2015). Video learning media that contains audio visuals that are expected to provide experience and examples of application of theory in the field of science (Mu'min, 2019).

Using of learning media shows a good result in learning process. It can shows by some previous researchs that also using the same media which is video learning media and analyzed with different methods. The research by (Anshori, 2015) that using Quasi Experiment method shows that using of video learning media has succesfully influencing students activity and increasing the learning result. Another research with the same method, shows the result that using video as a learning media effectivly help student understanding than just using images in learning process (Mu'min, 2019). (Pangestu et.al, 2019) with their research with using Research and Development method also shows that more creatively video like with stop motion creation to deliver the information, can make students get a good score in learning process. Through with 4D Model Design method (Suarsini & Kertih, 2020) shows that social media which is contain a video like instagram also can help students to understand in learning process because it can more attractive and interesting ways to give the lesson. According to those research, this research was conducted to see and analyze the increase in simulation practice of volcanic eruption disaster mitigation through the use of video learning me

However, efforts in producing digital media such as videos in geographic education study program are still very minimal, so students do not get any examples of good scientific application. Therefore this research is conducted to analyze the success of video learning media in improving student understanding and skills in performing simulation practices of volcanic eruption disaster mitigation.

2. Method

This type of research is an experimental research. Experimental research is a research method used to seek the influence of certain treatment on others under controlled conditions (Sugiyono, 2018). The selected design for this research is Pre-Experimental Design with One Group Pretest-Posttest Design. The use of this design is selected because there has been no treatment as long as the pre test is given. The results of treatment can be seen through comparison to the circumstances before and after the treatment. Conditions before is being taken before the viewing of video learning media , while conditions after was taken after the video learning media are viewed. Research design can be seen in the following images:

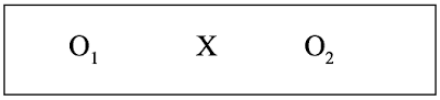

Figure 1. One Group Pretest-Posttest Design (Dantes, 2017; Maharani et al, 2019)

Description:
O_1 = pre test score (Before get the treatment)
O_2 = post test score (After get the treatment)
X = Treat (Using of video learning media)

Population is a generalization area composed of objects or subjects that have certain characteristics and qualities set by the researcher (Sugiyono, 2015). The population of this study are 5th semester students of Geographic Education Study Program in the 2020 class who take disaster mitigation subject. Samples are part of the population taken and are considered to represent the population using certain pickup techniques (Agung, 2016). The sampling technique used in this study is saturated samples. The selection of saturated samples is based on the number of members of the population who are entirely used as samples. The consideration of selected this sampling technique is also based on the small number of population members, which are 27 people.

The data collection methods used in this study are observation, test, quisionare and documentation. The type of test used is a multiple choice for cognitive assessment and the type of questionnaire is used to all of 5th semester students in 2020 class whose took disaster mitigation courses as a means to see if the use of video learning media can help them better understand the theory and help them to see the implementation of simulation practices as a form of mitigation in volcanic eruption disasters. Observations in this study were used to observe students enthusiastically during the viweing of video learning media, and observations were also performed on learning devices such as RPS (Semester Learning Plan) in disaster mitigation courses, student absence list to find out the number of students and benchmarking of several video references to compilation of learning media. Documentation is done to obtain data on learning activities while taking place and practice when carrying out simulations of volcanic eruption disasters. Details related to the method and type of data obtained can be seen in the following images:

Table 2. Collecting Data Methode and Type of Data

No	Collecting Method	Type of Collecting Data
1	Observation	RPS of Disaster Mitigation Course
		Students attending list
		Video reference as base to compose the media
		Students enthusiasm while viewing the video learning media
2	Test	Cognitive assesment (such as pre test dan post test)
3	Quisionary	Effectivity of using video learning media
4	Documentation	Learning proccess activity
		Simulation practices of volcano eruption disaster

(Source: Author, 2023)

This research also through several stages. The stage starts from the preparation, implementation and evaluation stage. The preparation stage starts from discussion with

lecturers of the subject, adjustments to CPL (Graduates Learning Achievement) and CPMK (Subject Learning Achievement), bench marking video as the base for creating video media learning, script preparation and picking test content. At the stage of implementation, there are socialization activities packed in the learning process, and at the stage of evaluation which is the end of the series of activities carried out with the evaluation activities of the learning media and the upgrading process of learning media. The description of the research stage is presented by the following images:

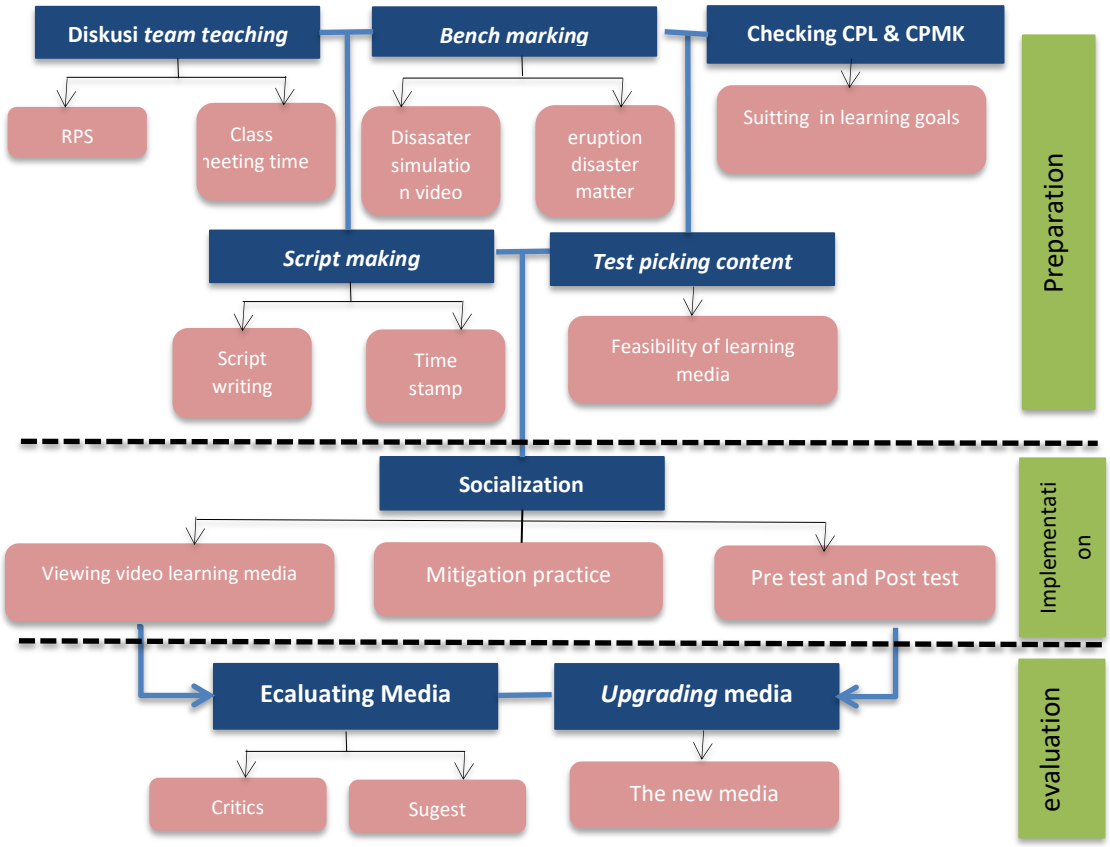

Figure 2. Research Flow Diagram

3. Result and Discussion

A. Result

This research was applied during two meetings, which are pre test and post test were given in every meeting. The test is given in the form of multiple choice with answers options in the form of a, b, c and d with the total of questions are 10 questions. Calculation of value is done on the results of the student post test. At the first meeting, there was an increasing student score that shown in post test which are earned the most frequency of grades at interval classes of 60-69 is about 16 students.

Tabel 3. Students Post Test Score Distribution at The First Meeting

Class	interval	*fi*	*xi*	*fixi*	|xi - $\bar{x}$|	|xi - $\bar{x}$|^2	fi |xi - $\bar{x}$|^2
1	20-29	2	24.5	49	-34.38	1181.64	2363.28
2	30-39	2	34.5	69	-24.38	594.14	1188.28

3	40-49	7	44.5	311.5	-14.38	206.64	1446.48
4	50-59	10	54.5	545	-4.38	19.14	191.41
5	60-69	16	64.5	1032	5.63	31.64	506.25
6	70-79	11	74.5	819.5	15.63	244.14	2685.55
Total		48		2826			8381.25
Average ($\bar{x}$)				58.875			
Deviation Standard				13.214			

At the second meeting there was an increasing score in post test from the first meeting with the number of students who received score at interval classes of 80-91 is about 15 people.

Table 4. Studenst Post Test Distribution at The Second Meeting

Class	**interval**	**fi**	**xi**	**fixi**	**$\|xi - \bar{x}\|$**	**$\|xi - \bar{x}\|^2$**	**fi $\|xi - \bar{x}\|^2$**
1	20-31	3	25.5	76.5	-37.58	1412.63	4237.88
2	32-43	7	37.5	262.5	-25.58	654.59	4582.11
3	44-55	7	49.5	346.5	-13.58	184.55	1291.85
4	56-67	14	61.5	861	-1.58	2.51	35.17
5	68-79	7	73.5	514.5	10.42	108.47	759.32
6	80-91	15	85.5	1282.5	22.42	502.44	7536.55
Total		53		3343.5			18442.87
Average ($\bar{x}$)				63.08			
Deviation standard				18.654			

The F test results indicate that the Fcount value = 1.83 and the Ftable value with significance of 0.05 is 1.92 so that Fcount < Ftable. Based on the results, it is known that the data used are homogene and have the same variance. Normality Test is using Kormogolov-Smirnov Analysis refers to the results of post tests obtained by students at two meetings that can be seen in Table 5 and Table 6:

Table 5. Normality Test at The Fisrt Meeting

No	**x**	**F**	**F (kum)**	**Kp**	**Z**	**Fz**	**a1**	**a2**
1	20	2	2	0.037	-2.942	0.001630734	0.002	0.035
2	30	2	4	0.074	-2.185	0.014437738	0.023	0.060
3	40	7	11	0.204	-1.428	0.076587047	0.003	0.127
4	50	10	21	0.389	-0.672	0.250907681	0.0472	0.138
5	60	16	37	0.685	0.085	0.533923753	0.1450	0.151
6	70	11	48	0.889	0.842	0.80008086	0.1149	0.089
7	80	6	54	1	1.599	0.945054495	0.0470	0.055
Total		54						
Average		58.875						

Dev. Standr	13.214

Table 6. Normality Test at The Second Meeting

No	x	F	F (kum)	Kp	Z	Fz	a1	a2
1	20	2	2	0.037	2.330	0.9901	0.916	0.953
2	30	1	3	0.056	1.789	0.9632	0.889	0.908
3	40	7	10	0.185	1.248	0.8939	0.579	0.709
4	50	7	17	0.315	0.707	0.7601	0.316	0.445
5	60	15	32	0.593	0.166	0.5658	0.251	0.027
6	70	7	39	0.722	0.376	0.6464	0.054	0.076
7	80	11	50	0.926	0.917	0.8203	0.098	0.106
8	90	4	54	1	1.458	0.9275	0.002	0.072
Total		54						
Average		63.06						
Dev. Standr		18.482						

According on the calculation results on Table 5 for the first meeting obtained Dh = 0.151261432 and Dt = 0.185072558. At the second meeting obtained Dh = 0.053055511 and Dt = 0.185072558. From both results it is obtained that Dh<Dt so it can be concluded that the data is distributed normally.

B. Discussion

The use of video learning media in disaster mitigation courses can improve students' understanding of volcano eruption disaster mitigation materials as well as skills in performing eruption disaster simulation practices. This is because digital-based learning media can help improve activity and creativity (Priyatmojo, 2019). Increased activity and creativity occur because students witnessed the material through images (visual) and audio-heard narratives, so there were examples that could be seen directly. This learning experience is also supported with more interesting packaged information, so it is easier to absorb by students when delivering materials in the learning process is underway.

Meanwhile, the using of video learning media has also never been applied on disaster mitigation courses for volcano disaster and simulations chapter, so students become more interesting in seeing the form of practice that must be done when eruption disaster occurs and students become more understanding of the subject because video learning media is presented with audio and visual. This combination of audio and visual are also able to convey matter and information more effectively when compared if we apply the matter just in text only (Dwiyanza et al, 2018). Furthermore, volcano disaster simulation practices require clear guidance. Simulation practice instruction will be more difficult to understand when packed in text form, because simulation practice is a series or stage of activity, if the series or stages are not clearly delivered, how can it be reactivated correctly and accordingly? Video learning media can also be a means for students to reconstruct the knowledge acquired according to their perceptions to be their basic for creativity. Student enthusiasm when the subject is given also feels different.

Students become more interested when video is start playing. This condition differs when the delivery of material when the video has not been shown. The images and sounds that students see in person and videos containing explanations and examples of subject, become more relevant and effective to understand.

Figure 3. Kondisi pembelajaran saat media pembelajaran ditampilkan

Simulation practice activities that engage students actively, become more directed after the delivery of video learning media. The application of video learning media when the learning process takes place causes students to be more interested and easy to understand the purpose of the subject, especially in learning that has practicum activities (Fitrianingsih and Musdalifah, 2015). Students become more aware of the steps and stages performed during simulation. Based on the video shown, students are able to sort the stages of activities carried out during eruption disaster. The order of activities practiced by students are (1) Bring just the important thing; (2) Pay attention to evacuation path instructions; (3) Use self-protective tools such as mask; (4) Goes to assembly point; (5) Aware of eruption material and find the shelter; (6) Always be in groups and do not go self-split; (7) Stay update of the latest information from the government. Simulation practices performed by students in groups. Each group practices simulation activities based on information and examples of simulations that have been shown before through video. Student participation in demonstrating the correct simulation practice can also be an indicator that students are able to understand both the material and the example of the simulation stage of volcanic eruption

Figure 4. Practice Activity of Eruption Disaster Mitigation by Students

The use of video learning media also improving student to understand, able to bring the good vibes during the learning process, especially when practical activities are shown by each group of student. This learning experience has never been obtained by students in this course before, so it is a new experience for them, especially experience in performing simulation practice of volcanic eruption mitigation. If previously students

only obtain guidance and ways to simulate in the form of text book, then with this video learning media students are able to witness directly the practice of simulation eruption disaster which they can then demonstrate again.

4. Conclusion.

Based on the results of the research, it can be found that the use of video learning media can improve students' understanding in Geographic Education Program, FKIP University of Khairun, in disaster mitigation courses. This increase can be seen from two things, first is from cognitive understanding of the mitigation material of volcanic eruption that is shown in the increase of pre-test and post-test results. Second, simulation practices are performed correctly and according to the stage by students, indicate that there is implementation of the material they receive into the form of practice activities. Good simulation practices by students are the result of their understanding of information and materials presented through video learning media. The use of video learning media also helps students to gain examples of more effective and relevant activities. Examples of activities that can be presented directly and the delivery of interesting packaged materials in audio and visual form, are the main factors behind the success of students in understanding the material and practices.

The suggest that can be given from this research is be able to increasing creativity by using technology to produce digital-based learning media, especially on the subjects in the courses that contain practicum activities. Digital learning media development is not just limited on video, but it can also develop other learning media such as digital comics, podcasts, websites and others. Producing digital-based learning media also become a form of implementation of the digitalization era on teaching materials. Hopefully, the learning media is able to make the learning process more interesting and help students to understand the subject, because it can more relevant and can be an effective information.

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