EFFECT OF NATURAL DISASTER-BASED VIDEO MEDIA TO INCREASE STUDENT'S ENVIRONMENTAL SENSITIVITY

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Abstract: This article discusses the benefits of technology on learning media for environmental education. The research objective was to see the impact of natural disaster video media on increasing student sensitivity. The research method used was experimental with research samples from two groups of 30 students in Accounting and Financial Institutions at SMK Yatindo Bekasi . The instrument used was a questionnaire with multiple choices. Data analysis used inferential statistics with SPSS Version 22. The test results on the normality test for the experimental class and control class obtained a count sig value = 0.200> 0.05 sig table with normal distribution. The homogeneity test obtained a sig value of 0.58> 0.05 sig. table, the results of the recommendations are equally homogenous variant groups. In the hypothesis test, the t-test value was obtained = 5.970> 2.002 or sig (2-tailed) = 0.000 <sig table = 0.05, the results of the students' environmental sensitivity score in the experimental class were higher than the control class. It happens that students can increase environmental sensitivity if facilitated by video media of natural disasters, because it is necessary to instill environmental sensitivity.

Keywords: Video media, natural disasters, environmental sensitivity.

Introduction

Environmental sensitivity can be interpreted as an environmental response to environmental changes (Basso, 2000). Environmental sensitivity is also an empathic view or understanding of the environment (Sivek, 2010). Environmental sensitivity is an individual characteristic to perceive the environment with empathy (Cheng & Homer, 2014). Ferguson, *et al.,* (2020) stated that empathy is an effective component (sharing experiences, feeling what you feel), a cognitive component (taking perspective, putting yourself in the position of others) and a deliberate component (compassion and to have intentions). Hungerford and Volk (2013) say that environmental sensitivity is a behavioral variable related to environmental education which has the objectives of the agreement at the 1978 Tbilisi conference, namely: a. Awareness: helping individuals and social groups gain awareness and sensitivity to problems related to the environment; b. Sensitivity: helps individuals and social groups gain experience and understand basic environmental problems; c. Attitudes:

helping individuals and groups gain values and feelings about the environment and motivation to support activities to improve and protect the environment; d. Skills: helping individuals and groups acquire skills to cope with and solve environmental problems; e. Participation: provide opportunities for individuals and social groups to be actively involved in working to solve environmental problems. The role of education is important in disseminating information, especially for students, because they are the younger generation who will take advantage of and manage this environment. It is necessary for future generations to be equipped with knowledge of environmental education in order to have a responsible attitude and be able to participate in environmental problems (Feszterova *et al.,* 2015). In addition, the goal of environmental education is to create individuals who are sensitive to environmental problems (Alaydin *et al.,* 2014). Environmental education is important to promote environmental sensitivity among the community (Hassan *et al.,* 2011). In previous research conducted by Sivek (2010)

that the main factor for instilling long-term environmental sensitivity is important to have learning experiences outdoors or visiting natural areas. Referring to these findings, researchers will continue research related to environmental sensitivity, to find out whether environmental sensitivity will grow in students by interacting through social media (videos based on natural disasters) in a limited space (class).

Environmental education objectives above e that environmental education provides knowledge about the values of positive attitudes and behaviors, skills and participation to be active in environmental problem-solving activities. One of the environmental problems caused by nature is natural disaster. After a disaster, there will be a lot of damage in various places which causes complex impacts on the social and environmental systems (Davidsson, 2020). Shoji *et al.,* (2020) stated that natural disasters cause many human lives to be lost. Disasters that occurred between 1996 and 2015, caused 135 million lives to be lost, of which 56% were victims of natural disasters. Natural disasters can also have a negative impact on the physical, biological and social environment of human life (Sangha *et al.,* 2020). Based on information from world organizations, in the last 20 years (1998-2017), approximately 1.3 million people died and 4.4 billion people were affected by natural disasters (Research Center for Epidemiology of Disasters) and the latest news from the World Health Organization reported that an average of about 90,000 people died out of 160 million people affected by natural disasters each year (Sangha *et al.,* 2020). In Indonesia, between January 1 and December 23 2019, 3,721 natural disasters occurred, including forest and land fires, floods, landslides, droughts, earthquakes, tidal waves, volcanic eruptions, tornadoes (Luthfia Ayu Azanella, 2019). Hidalgo, *et al.,* (2019) described natural disasters in table 1, as follows:

Natural disasters are studied by students

Table 1: Classification of natural disasters (Hidalgo, *et al.,* 2019).

Classification of Natural Disasters			
Geophysical	Hydrologic	Meteorological	Climatologic

• Earthquake Ground shaking Tsunami
• Volcano Volcano eruption
• Mass movement (dry)
  1. Rockfall
  2. Landslide Mudslide Lahar Debris flow
  3. Avalanche Snow avalanche Debris avalanche
  4. Subsidence Sudden subsidence Long-lasting subsidence
	• Flood
	  1. General flood
	  2. Flash Flood
	  3. Storm surge/ coastal flood
	• Mass movement (wet)
	  1. Rockfall
	  2. Landslide Debris flood
	  3. Avalanche Snow avalanche Debris avalanche
	  4. Subsidence Sudden subsidence Long-lasting subsidence
		• Storm
		  1. Tropical cyclone
		  2. Extratropical Cyclone (winter storm)
		  a. Convective storm Thunderstorm/ lightning Snowstorm/ blizzard Sandstorm/ dust storm Generic (severe) storm Tornado Orographic storm (strong winds)
		  b. Local storm
			• Extreme temperature
			  1. Heatwave
			  2. Coldwave Frost
			  3. Extreme winter conditions Snow pressure Icing Freezing rain Debris avalanche
			• Drought
			• Wildfire
			  1. Forest fire
			  2. Landfire

in natural science subjects in the experimental group and the control group. A natural disaster is an event, so researchers needed to show videos of natural disasters to experimental group students to find out the impact of natural disaster video media to increase students' environmental sensitivity. According to some experts, videos can be used to promote learning materials, (Sun & Hsing, 2007). Video is an influential teaching tool to attract public attention and has the potential to motivate learning (Nasir, *et al.,* 2017). ideo in education has been widely used as an innovative solution that can meet the needs of (1) increasing knowledge, and (2) as a method for evaluating technical skills and competencies (Green L *et al.,* 2019). Instructional video media is a very effective educational tool (D'Aquila *et al.,* 2019). Merkt *et al.,*(2011) stated that video is an integral component of daily environmental education for students, but from the perspective of educational psychology, the status of video as an effective learning medium cannot be doubted. The use of videos can help and facilitate learning by modifying behavior, so as to improve their social and communication skills (Saiman *et al.,* 2013). In addition, the advantage of using instructional videos is that they can show a link between animated screenshots and real-life task execution (Van der Meij *et al.,* 2014). According to the opinion of the experts above, video media is a communication tool that uses an audiovisual component that can become a modern learning medium, while providing understanding and knowledge for its users. Referring to previous research conducted by Fraustino *et al.,* (2018) immersive visual technology media can be an effective tool to attract viewers to content and increase their positive attitude towards it. Knowledge on natural disasters is very important for crisis audiences to know during the disaster recovery phase.

Materials and methods

This research uses a quantitative approach and experimental methods. The research population comprises Vocational High Schools (SMK) in Mustika Jaya Village, Bekasi, Odd Academic Year 2019/2020. The research sample was randomly selected using purposive cluster random sampling among students of SMK Yatindo class X-2 (30 students consisting of 25 girls and 5 boys) and class X-1 (30 students consisting of 26 girls and 4 boys). Their characteristics are young people who will become future leaders in making policies and protecting the environment. The experimental class was selected based on the learning outcomes of natural disasters the students previously studied. Learning outcomes averaged 118.5 (low score) in the experimental class, while the group of students with an average 124.5 (high score) are in the control class. This learning strategy will use natural disaster-based video media. This learning is only followed by Class X-2 students as an experimental group with the Discovery learning method and in groups because they are assigned to search for videos based on natural disasters on YouTube and the video will be displayed in front of the class. Only a few students have tried to find videos on YouTube. So through the video search process, students are formed learning groups so that they can share with each other. Members help and encourage each other to learn and share knowledge (Laal, 2012).

In the learning process to show the video to an audience, students must have supporting technology that has been prepared by the school, such as: laptops, projectors, speakers, video storage flash drives and environmental situations. After the presentation of the assignment was complete, the two groups of students (experimental and control) were given an environmental sensitivity instrument test. To measure environmental sensitivity, Metzger *et al.* (2010) stated that environmental sensitivity can be measured using the Environmental Sensitivity Questionnaire (ESQ) with a Likert scale. The basic structure of the ESQ follows the taxonomic goals of education in the affective domain. Its objectives areas; (a) Receiving (awareness, desire to receive, control or choose attention); (b) Responding (agreed response, willingness to respond, satisfaction

with the response); and (c) Appraisal (value acceptance, value preference, commitment to value explanation). Of the three objectives, as a grid and indicator aspect, an environmental sensitivity instrument was made in this study. The environmental sensitivity instrument grid and sample questions in this study are presented in Table 2, as follows:

Table 2: Environmental sensitivity instrument grid and sample problems

No.	Aspect	Indicator	Problems Example
1	How to accept the natural and social environment	The attitude of accepting God's creation. The attitude of accepting the existence of others.	I accept and believe that this earth was created. I accept friends' ideas on mutual consideration.
2	How to respond	Attitude to respond to natural or social environmental situations.	I am concerned that the earth is currently experiencing global warming that has not been resolved, but natural disasters often occur in various countries. I respond to the government's recommendation in an effort to save energy in daily needs.
3	How to judge	Behavior of judging other people's work.	I will congratulate friends who pass with the best grades.

The environmental sensitivity instrument was made of 30 validated questions. And each question consists of 5 answer choices, namely: Strongly agree = 5 points, Agree = 4 points, Doubt = 3 points, Disagree = 2 points, and Strongly disagree = 1 points. Data obtained from the environmental sensitivity test of the experimental group students (class X-2) and the control group (class X-1) will be tested for hypotheses (t test) (a) normality test using Kolmogorov-Smirnov, the test criteria: if the significance value (sig) is greater than 0.05 then the research data is normally distributed and if the sig is smaller than 0.05, the research data is not normally distributed. (b) the homogeneity test uses the Levene test, the test criteria: if the sig < 0.05, then it is stated that the variance of the two data groups is not the same or not homogeneous and if the calculated sig > 0.05, it is stated that the variance of the two data groups is equal or homogeneous.

Next, the hypothesis test is carried out using the t test, conducted to determine and check the effectiveness of the treatment, the test criteria: Accept H_0 if: t-count < t-table or Reject H_0 if: t-count > t-table.

Result

After the learning process the researcher evaluates the learning outcomes, by taking the data obtained from the environmental sensitivity instrument test of students in the experimental class and the control class, the data is collected and grouped. Furthermore, the data is arranged in the form of a pie chart (figure 1).

Descriptive Data

Based on Figure 1, the data obtained from the environmental sensitivity instrument test were from 30 questions with a total of 150 responses, carried out by 30 respondents from the experimental group (class X-2). In the pie chart, several colors appear, this indicates the number of scores that students obtained from the environmental sensitivity instrument test. To read the results of a pie chart, starting from the smallest value or color grid (blue and green) with 3 respondents, a score of 125 - 127 or percentage of 83-84 is considered sufficient. In colors (light brown, purple, yellow, red, Tosca blue, gray, light blue, dark green, orange, and light purple) with 24 respondents, a score
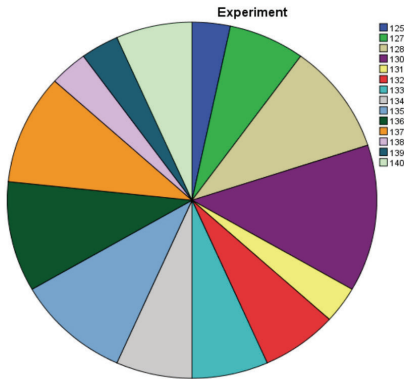
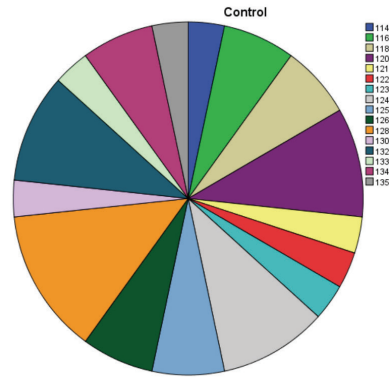Figure 1: Percentage of experimental group statistical data

Figure 2: Percentage of c ontro group statistical data

between 128 - 138 or a percentage of 85 - 92 is considered good. In Tosca blue, and light green, with 3 respondents, a score between 139 - 140 or percentage of 92.5 - 93 is stated in the very good category. Based on the above calculations, of the 30 student respondents in the experiment group (class X-2) can pass the minimum completeness criteria value = 75 and are included in the very satisfying category because 90% of students get a score of 85.

In Figure 2, the data obtained from the environmental sensitivity instrument test were 30 questions with a total of 150 correct answers, carried out by 30 respondents from the control class student group. In the pie chart, several colors appear, this indicates the number of scores that students obtained from the environmental sensitivity instrument test. To read the results of a pie chart or Pie Chat image, starting from the smallest value or color circle (blue, green, light brown, dark purple, yellow, red, Tosca blue, gray, light blue, and dark green)

with 18 respondents, a score of 114 - 125 or a value of 78 - 84, which is considered sufficient. Inorange, light purple, solid Tosca blue, light green, purple, and dark gray 12 respondents scored between 126 and 135 or a value of 85 - 90, which is in the good category. Based on the above calculations, all student respondents in the control group (class X-1), achieved the minimum completeness criteria value = 75, and are included in the satisfactory category because only 40% of students get a score of 85.

Calculation of Data Analysis

a. Normality test:

Based on Table 3, from the results of the calculation of the normality test with the Kolmogorov-Smirnov test for the experimental class (class X-2) and the control class (class X-1), the value (sig) = 0.200 means that the value (sig) is greater than the value (sig) table 0.05. then the result stated that the data from the two groups were normally distributed.

Table 3 : Tests of normality

	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Environmental Sensitivity	Experiment	.110	30	.200[*]	.965	30	.409
	Control	.107	30	.200[*]	.965	30	.410

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

b. Homogeneity Test:

The results of the homogeneity test using the Levene test showed that the sig value of 0.058 was greater than the sig table value of 0.05, meaning that the variants of the two groups were declared homogeneous. The results can be seen in table 4, as follows:

Hypothesis test

Furthermore, testing the hypothesis (t test) using independent samples test is carried out if the data analysis test meets the requirements. The results of hypothesis testing in this study obtained the test value of t = 5.970 > 2.002 or sig (2- tailed) = 0.00 < 0.05 (sig table), then the rejected hypothesis is H_0, where $t_{count} > t_{table}$, it is concluded that there is difference in students' environmental sensitivity scores between the experimental class (class X-2) who learned using video media based on natural disasters and the control class students (class X-1) without treatment. The results of hypothesis testing (t test) with the Independent Samples Test can be seen in Table 4, as follows:

Discussion

This research involves the use of natural disaster-based video media in environmental education to find out how students respond to environmental damage caused by natural disasters. Based on the results of this study, there were differences in students' environmental sensitivity scores between the experimental group (class X-2) who learned using video media based on natural disasters and students in the control group (class X-1) without treatment. The difference in environmental sensitivity scores an average of 133.10 (experimental group) and an average of 125.20 (control group). The results can be seen in Table 5, as follows:

Table 4 : Independent samples test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Environ-mental sensitivity	Equal variances assumed	3.752	.058	5.970	58	.000	7.900	1.323	5.251	10.549
	Equal variances not assumed			5.970	51,904	.000	7.900	1.323	5.244	10.556

Table 5: Data descriptive statistics

		Experiment	**Control**
N	**Valid**	30	30
	Missing	30	30
Mean		133.10	125.20
Minimum		125	114
Maximum		140	135

From these results it is evident that the impact of natural disaster-based video media can increase environmental sensitivity in the experimental group (class X-2). This study found three findings, namely: 1) the emergence of a positive view of students on social media (YouTube) in seeking new knowledge (videos based on natural disasters to increase their knowledge and skills, 2) the desire of students to learn about natural disasters and their mitigation, and 3) the important role of social media, through videos based on natural disasters, to build environmental sensitivity of students. The first finding is that there is a positive view of students on social media (youtube), after students are involved in looking for videos, so that students' knowledge and skills develop. Dehghani (2016) said that YouTube stores a lot of information and knowledge. YouTube is a social media resource that is widely used for professional purposes (D'Aquila, *et al.,* 2019).

For the second finding: students' curiosity to learn about natural disasters and their mitigation. By watching the natural disaster content on the video, students feel empathy, so they respond by asking questions. Empathy requires attention and cognitive effort (Ferguson *et al.,* 2020). Cognitive empathy is sometimes referred to as literature on perspective taking (Moore *et al.*, 2015). Kashdan *et. al,* (2020) says that curiosity is about seeking information and experiences for one's benefit by directing one's behavior and one of the most efficient and effective ways to obtain new information is by observing and interacting with the environment (communicating with others. To reduce the impact of these natural disasters, students must know how to mitigate natural disasters. The opinions of these natural disaster mitigation experts are shown in Table 6 as follows:

Table 6 : Natural disaster mitigation strategies

Disaster	Mitigation
Landslide	Choi *et al.*, (2013) said mitigating landslides by implementing the Landslip preventive Measures program; and strengthen the soil slope factor. Cotecchia et al.,(2016) landslide mitigation through multiscalar methods with the first phase, characterization of landslides; second phase, recognition of the connection between the slope factor and the process of instability.
Flood	Tamagnone, *et al.,* (2020) said the ability of native rainwater harvesting techniques (RWHT) to be used as a feasible solution for flood mitigation with rainwater harvesting techniques (RWHT).
Earthquake	Titaya (2016) said there is knowledge of responding that affects the ability of citizens during an earthquake and important information about regulations for earthquake resistant buildings.
A tsunami	Samarasekara, *et al.,* (2017) said that tsunami mitigation by building a tsunami warning system. Canales, *et. al.* (2019) said tsunami mitigation with evacuation measures as an important method to save lives..
Volcanic eruption	Gregg, *et al.,* (2008) say immediately give a little warning about the potential for an early eruption, and once an eruption begins it's time to respond, which means the security community needs steps to be taken to reduce the impact of a sudden eruption.

The third finding, the researcher focuses more on the importance of the role of social media to always present environmental problems in order to build environmental sensitivity for students as millennials who tend to be involved in the digital world. Feszterova, *et al,* (2015) said that environmental problems provide students with experiences, thus enabling them to actively participate in environmental protection activities while promoting positive attitudes. What are the attitudes of students who tend to be involved in the digital world? In the digital age,

social media has been recognized as a powerful "lens" that can expose the psychological state of people (Zou, *et al.,* 2020). And people who prefer social media are likely to have high levels of disclosure. different selves (Zou, *et al.,* 2020). Natural disaster videos displayed in the learning process can provide students with an expression of sensitivity to the environment through their attitudes and behavior. Disasters can have a physical and psychological impact on the people involved (Moa, *et. al.,* 2018). It is important to instil environmental sensitivity for humans in interacting with the environment (Campo, 2017). Particularly for students as the current and future generation, they should be responsible for environmental development in a sustainable manner.

Conclusion

The use of digital technology can guide other activities. In environmental education learning, a strategy is needed to involve digital media technology, such as video media. Video media   provides a clearer understanding of environmental problems because the current generation is more involved in activities with digital technology.Digital media technology can raise awareness on environmental problems that occur around them in order to realize that the environment needs to be cared for and preserved in a sustainable manner.   environmental education into formal education and can be supported with social media. This is one way to instill environmental sensitivity in students, so that they gain knowledge, sensitivity, attitudes, skills and active participation in solving environmental problems. This knowledge can be implemented by students so that they can act wisely in utilizing the environment and being able to solve environmental problems (natural disasters) in a collaborative manner.

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