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UTILISING DISASTER MITIGATION EDUCATIONAL VIDEOS TO IMPROVE THE UNDERSTANDING OF STUDENTS IN REDUCING ENVIRONMENTAL PROBLEM SOLVING

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Abstract: This study aims to determine students' understanding of environmental problems by studying disaster mitigation through the media. Researchers used the Two Group Pre- and Post-test Design. Subjects were selected by random sampling, involving two grade XII classes of the Daya Utama Bekasi Health Vocational High School. The 40 students selected were divided into two experimental groups, 1 and 2. The learning process is provided with a combination of contextual approaches, inquiry, and indoor and outdoor problem-solving. The data analysis was conducted using the SPSS ver. 24, beginning with the calculation of pretest and post-test data, normality and homogeneity tests with the assumption that the distribution is normal and homogeneous, followed by the t-test. The experimental group 1 is found to have experienced an increase in knowledge with an average score of 17.30 and this increase is supported by the gain test results of 0.64. There are differences in students' understanding of reducing environmental problems between those who study disaster mitigation through video media (experimental group 1) and textbook media (experimental group 2). The strategy for developing computer technology competencies for educators will be the key to future success in disaster mitigation learning.

Keywords: Disaster mitigation knowledge, environmental problems, problem solving, learning media.

Introduction

Based on Presidential Regulation of the Republic of Indonesia No. 8 of 2008, government agencies through the National Disaster Management Agency (BNPB) are tasked with conveying information on disaster management activities to the public (Astuti *et al*., 2021a). But how about providing disaster education in schools? Currently, disaster education in Indonesia is integrated into the school education curriculum. Kontar *et al*. (2021) said that disaster education in schools is mostly integrated in the domain of natural and social sciences. Kamil (2020a) added that the National Curriculum (Curriculum, 2013) in Indonesia includes disaster education at the high school level.

Disaster management knowledge can be introduced in schools by focusing on disaster preparedness. Sakurai *et al*. (2020) found that disaster education has been promoted worldwide since 2005 until 2015, Hyogo Framework for Action (HFA) established three Priority Actions to use educational innovation and knowledge to build a culture of safety and resilience at all levels. Disaster education is defined as formal instruction on disaster risk, mitigation, and preparedness to reduce the negative consequences of disasters. According to David and Benno (2021), a disaster is an event that occurs suddenly, which greatly disrupts the functioning of a community or society and causes human, material, and economic or environmental damage that exceeds the ability of the community or society to cope. Lin and Kai (2020) explained that the only way to lessen the impact of disasters is to prepare people for these situations by instructing members of the community on the proper response and building structures resilient to such events.

Disaster education learning materials for secondary schools based on the National Geographic Standards can be integrated into lesson plans. Songwathana and Rekha (2021) revealed that disaster preparedness knowledge and skills are focused on mitigation or prevention, preparedness, response, and recovery or rehabilitation. According to Sasmita *et al*. (2022), disasters can be caused by changes to the environment that are the result of climate change and human pollution (Davidsson, 2020). Natural disasters such as earthquakes, hurricanes, droughts, and floods are global challenges because of the uncertainty they cause and the potential for significant social, economic, financial, and environmental impacts (Hu *et al*., 2014; Olanrewaju *et al*., 2020). Sanchez and Ricardo (2019) explained that environmental problems can be categorised as complex problems. However, environmental problems are often ignored or not taken seriously even though initially the environmental movement contributed to a wider public understanding (Carson, 1962; Maurer & Bogner, 2020). This study aims to increase students' understanding of environmental problems by studying disaster mitigation education.

According to Astuti *et al*. (2021b), sharing disaster experiences directly and indirectly can influence students; thus, increasing knowledge and awareness of disasters and understanding the consequences. Understanding environmental problems caused by disasters is very important, especially for students as the next generation of society. They can contribute thoughts and actions on sustainable development and solve environmental problems. The United Nations urges all parties to participate in solving environmental problems (Zuhriyah *et al*., 2021a). Araiza *et al*. (2021) compiled the opinion of experts that problem solving is at the heart of education (Thomas F. Stahovich *et al*., 2019; Stahovich *et al*., 2019) and an important skill for students (Cornoldi *et al*., 2015). In addition, Guner and Erbay (2021) state that problem solving means dealing with complex situations.

According to J. Liera and Newman (2020), effective problem solving requires five main components: (1) Problem orientation that is trust and perceived control over the problem-solving process, (2) problem definition and goal identification, (3) generate solutions, (4) decision making, and (5) implementation or verification. This study focuses on solving environmental problems starting with: (1) Understanding the environmental problem, (2) planning the solution, (3) implementing the solution, and (4) making reports. Lee and Lee (2020) stated that problem-solving skills can be seen as one of the core abilities that adolescents need to develop to prepare themselves for uncertain situations and complex societies. Previous research by Buckingham *et al*. (2020) has also helped students understand how to design more effective natural disaster responses. According to other experts, this can be done by simulating a disaster response using innovative learning techniques (Murray *et al*., 2019; Malesic, 2020). At the Daya Utama Vocational High School Bekasi, the teacher informs students of the provision of disaster mitigation materials in the form of textbooks and youth Red Cross activities.

However, the teacher is not ready to provide instruction on disaster mitigation, resulting in students who are less motivated to learn and understand environmental problem solving. This failure can be seen after students are assigned to answer questions based on environmental problems. This phenomenon is supported by the floods that have occurred in Bekasi. Disaster mitigation is crucial for the prevention of natural disasters that occur. This can be seen in Table 1.

The increase in the number of floods proves that Bekasi residents still have a low level of knowledge in managing the environment in a sustainable manner. Flooding in the city has become routine when extreme weather such as rain lasts for days. The subdistrict that has experienced an increase in flood events is Bekasi Utara because this area is very close to the sea, so, it has a very low-quality soil composition compared with the mainland. For this reason, the government is trying to increase education

Table 1: Flood disaster by district in Bekasi City (2019-2021)

Subdistrict	Floods		
	2019	2020	2021
Pondokgede	0	4	4
Jatisampurna	0	1	0
Pondok Melati	3	2	3
Jatiasih	3	3	5
Bantar Gebang	0	4	4
Mustika Jaya	2	1	3
Bekasi Timur	3	4	4
Rawa Lumbu	3	2	4
Bekasi Selatan	0	2	4
Bekasi Barat	5	5	4
Medansatria	2	3	4
Bekasi Utara	3	5	6
Total	**24**	**36**	**45**

Source: BPS Bekasi City (2023)

in schools in an effort to decrease the incidence of various natural disasters.

The increasing phenomenon of environmental problems has not been well responded by some individuals, community groups, and institutions, namely educational institutions in Indonesia. Based on information from the principal of the Daya Utama Health Vocational School in Bekasi, disaster mitigation education is not included in mandatory subjects but is included in extracurricular activities. However, they have received disaster mitigation education from the Indonesian Red Cross in 2019. The lack of disaster mitigation education provision has made us interested in conducting research at vocational schools. This research will promote and provide environmental education related to disaster mitigation education to students, who are the next generation that should continue environmental preservation in a sustainable manner.

The novelty of this article is to provide students with an understanding of mitigating environmental problems caused by natural disasters that are the result of human actions and what solutions are possible after students are given knowledge on disaster mitigation through applied learning activities. The framework design for reducing environmental problems is presented in Figure 1.

The framework for reducing solutions to the environmental problems above, referring to expert opinions, starts with changes in the earth's climate, which has become a global issue due to greenhouse gases produced by human activities such as burning forests or garbage, felling of trees, industrial activities, and the use of products that are not environmentally friendly. This human activity can increase the earth's temperature, thereby causing environmental problems. However, this condition is ignored by humans. Evidence from several studies investigating the risk perception of climate change could encourage action that helps overcome climate change more effectively. However, lack of action (Wang *et al.*, 2021) will lead to a series of natural disasters.

A natural disaster often occurs suddenly and is often hard to predict, resulting in a degraded environment that is not conducive to habitation. This is a routine and complex problem. Leite *et al*. (2024) said that environmental problems can be caused by natural disasters, affecting social, economic, and environmental activities. This

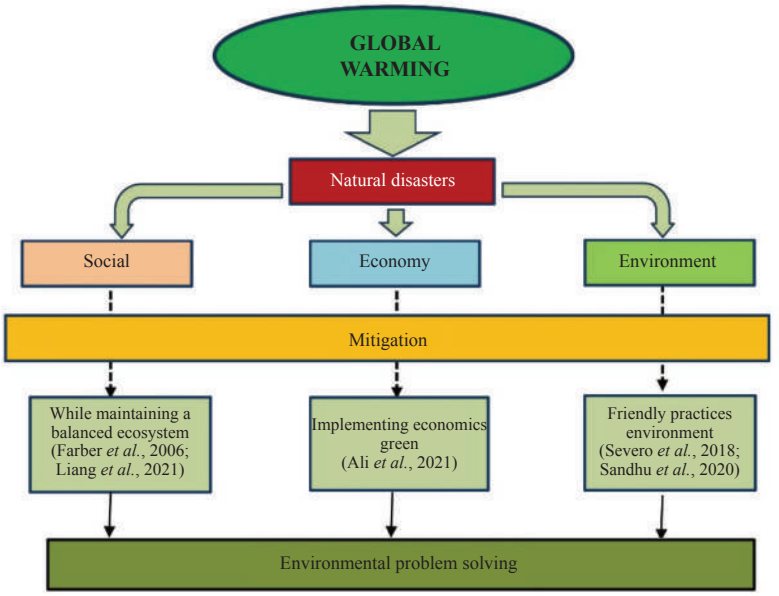


Figure 1: Framework design for reducing environmental problems

problem requires more effort to be resolved. The United Nations and many countries have implemented various strategies for disaster reduction. These mitigation strategies were evident at the First World Conference on reducing natural disasters in 1994 (Cui *et al*., 2021). Researchers have come up with innovative strategies to reduce environmental problems. By adopting the views of experts, solving environmental problems to reduce the risk of disasters can mitigate the social impacts of these events while maintaining ecosystem balance (Farber *et al*., 2006; Liang *et al*., 2021). In the economic domain, disaster mitigation actions include implementing a green economy, for example by using environmentally friendly products (Ali *et al*., 2021). In the environmental aspect, mitigation actions are in addition to promote environmental awareness among students or the public through education (Suarez-Perales *et al*., 2021) and the adoption of environmentally friendly practices, for example, recycling plastic waste (Severo *et al*., 2018; Sandhu *et al*., 2020).

This mitigation action is to reduce disaster risk in order to reduce the need for environmental problem solving due to natural disasters resulting from global warming. Disaster mitigation knowledge is very useful in everyday life to anticipate unpredictable disasters. This knowledge is easily obtained by students or the public through various media, one of which is popular online video streaming platforms like YouTube. Based on the theoretical description and views of experts above, the problem in this research is as follows: Can the use of disaster mitigation learning media promote understanding among students in class XII of Daya Utama Vocational High School, Bekasi on reducing environmental problem solving? This research aims to provide students with an understanding of solving environmental problems arising from natural disasters through disaster mitigation learning media for students or individuals or community groups.

To provide an understanding of solving environmental problems, learning activities can be facilitated by video media. Experts cited in Zuhriyah *et al*. (2021b) suggest that using video as a teaching tool could attract students' attention and motivate learning. Gampell *et al*. (2021) found that showing videos of a scenario before a disaster hit has the potential to instil awareness through depictions of danger, vulnerability,

capacity, and disaster risk reduction. Showing videos of activities during a disaster can provide valuable insight into how people conceptualise disasters in their daily lives. In this study, researchers will introduce the National Disaster Management Agency's inaRisk application, which provides disaster mitigation educational information in an innovative way. The inaRisk application helps students to learn about disaster risk in their school environment.

Materials and Methods

Research Design

The design of this quasi-experimental study used the Pretest Post-test Non-equivalent Control Group Design, which provides a pretest and a post-test treatment for both study groups.

Based on Table 2, the research design starts by giving a pretest to the research subjects. Those who score low in the pretest are placed in group 1, where follow-up learning is using video media from the inaRisk application. Those who score high are put in experimental group 2, where subsequent learning is by textbook. After the learning process, a post-test is administered.

Sample

The subjects of this study were all Health Vocational High School students, who took part in extracurricular activities. The subjects were chosen by random sampling, namely 20 students, who took part in non-Red Cross extracurricular activities, as experimental group 1 studying disaster mitigation through YouTube videos with an average pretest score (12.40) or low score while another group of 20 students took part Red Cross extracurricular, as experimental group 2, they studied disaster mitigation through disaster through textbooks with an average pretest score (14.00) or high score. Before being given treatment, the research subjects were given pretest questions about disasters to determine initial abilities. After the learning activities were completed, both groups of students were given post-test questions on solving environmental problems caused by flooding to determine students' understanding.

In Figure 2, the photo was taken fully approved voluntarily by the school, so there was no coercion in the research process.

Figure 3 explains the learning activities that have been carried out for 4 weeks, totalling

Table 2: Research design

Groups	Pretest	Treatment	Post-test
Experiment 1	O_{A1}	X_1	O_{A1}
Experiment 2	O_{B2}	X_2	O_{B2}

Figure 2: Students carry out charity activities to donate food to disaster victims
Source: Authors (2023)

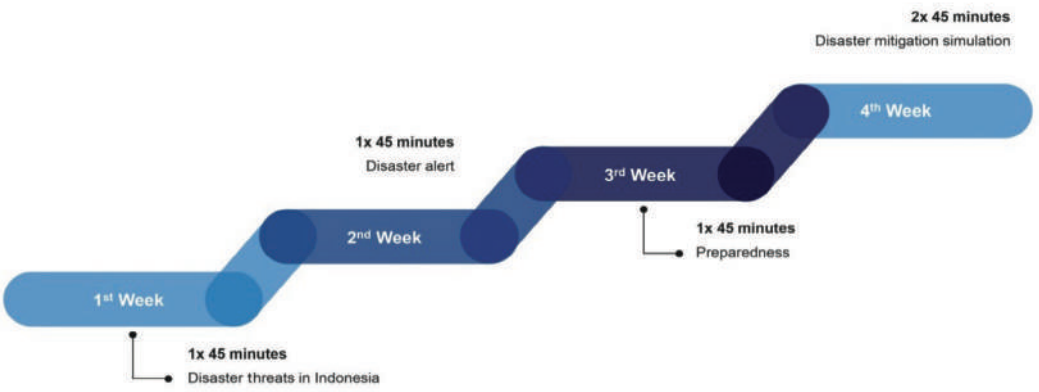
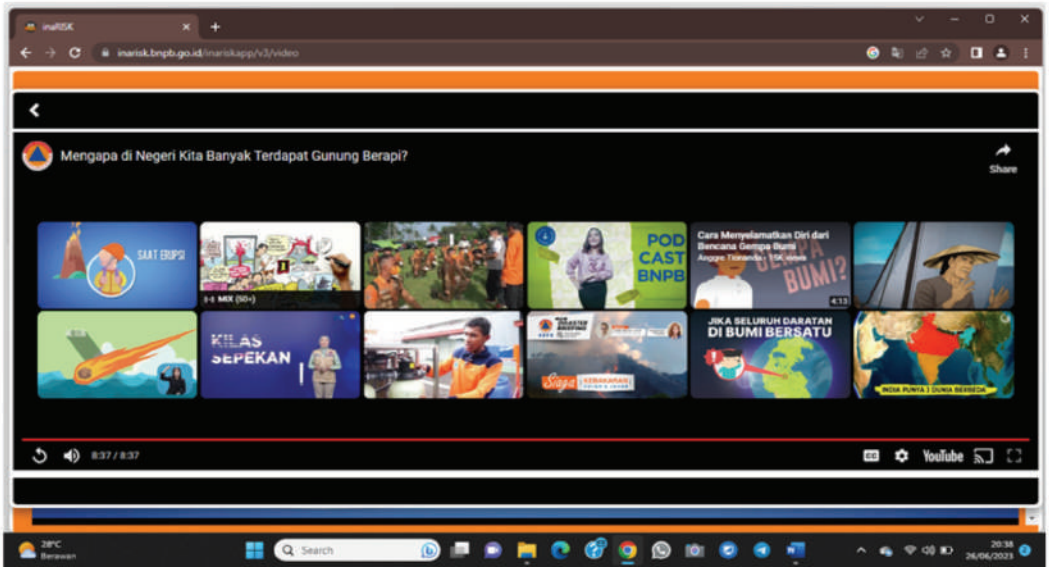


Figure 3: Disaster mitigation learning content
Source: Authors (2023)

five hours of lessons, the disaster mitigation learning material provided to the two groups are with the following learning indicators; students are aware of the threat of disasters in Indonesia, students learn the phases of disaster preparedness, students understand efforts in disaster preparedness, and students are able to simulate disaster mitigation efforts. First week: Material about the dangers of disasters in Indonesia. Second week: Material on stages of disaster preparedness. Third week: Preparedness material. Fourth week: Disaster mitigation simulation material.

Disaster mitigation education materials for students in the control group were from the pocketbook Disasters by BNPB while students in the experimental group used the inaRisk application by BNPB. The inaRisk application provides various Disaster Mitigation Education videos. These are images of the inaRisk application and videos of its disaster mitigation education. Figure 4 (a) displays the inaRisk video regarding disaster knowledge while Figure 4 (b) is a screen grab of a video in the inaRisk application that explains the



(a)

(b)

Figure 4: (a) inaRisk application content and (b) disaster mitigation learning videos
Source: BNPB (2022)

types of disasters: Natural disasters, non-natural disasters, and social disasters.

Instrument

The pretest is a set of 20 questions each with four answer options on environmental problems. The post-test on disaster mitigation education comprised a passage about a natural disaster with four short-answer questions. Each question has a maximum score of five for a total of 20 points. Post-test questions have been tested for validity and reliability (Table 3).

Table 3: Story problem sheets

The events that shocked the world at the end of 2019, where citizens were worried about the Corona outbreak that originated in China. This worry is because the Corona virus spreads very quickly and is dangerous. In Indonesia itself, at the same time, anxiety is not only about the epidemic. Every year, disasters occur during the rainy season; this is not spared from the floods that occur in some areas. Floods also often occur in the residential area of Nusa Indah Villa and its surroundings because this area is close to the Cikeas River Basin, Bogor. At the beginning of 2020, there was a major flood with a height of 2 m at that time (https://bogor.ayoindonesia.com/). Thousands of residents' houses and other public facilities (e.g., schools, houses of worship, government offices or community organisations, public roads, and others) were submerged in water. This flood is the result of water shipments from the upstream of the Bogor area and the high volume of local rain in the rainy season, so that the river lanes in the Nusa Indah Villa area overflow. This flood has caused the river embankment to collapse because it was unable to hold the water discharge. The overflow of river water accelerated the water level to enter residents' homes, in the end, many residents did not have time to save their property and sometimes even claimed their lives. Based on this problem, the government has provided a solution for the local community to immediately evacuate to an area that is safe from flooding, but the discussion is constrained by the agreement of the local community and the government, regarding compensation money that does not match the current price of buying a house. In the word problem above, four questions are made as follows:	
Questions	**Score**
Question 1: If you understand the problem above, why do flood disasters often occur in the residential area of Nusa Indah Villa and state the environmental problems that arise as a result of the flood disaster and state the impact of the flood disaster on the lives of these people?	5

Answer: ……	……
Question 2: State and explain your plan or strategy in solving environmental problems as a result of the flood disaster?	5
Answer: ……	……
Question 3: How is the implementation of environmental problem solving in the Nusa Indah Villa housing the impact of the flood disaster? Are there environmental problems that are difficult to solve? What are the obstacles and are there any other alternative strategies that can solve them?	5
Answer: ……	……
Question 4: After carrying out a series of activities for handling and solving environmental problems due to disasters, you must make a report as evidence of your participation in solving environmental problems to report the time, place, situation, and environmental problems and explain the strategy and how to solve them?	5
Answer: ……	……
	Σ

Data Analysis

Before the data is analysed, the normalised gain score is calculated. This normalised gain test is to find out how much students' understanding of solving environmental problems has increased. The calculation used the average value of the pretest and post-test scores in the two research groups. The steps to determine the normalised gain score are as follows:

(1) Calculating the normalised gain score with the formula adopted from Hake (Coletta & Jeffrey, 2020), as follows:

$$N\text{-}Gain = \frac{Post\text{-}test\ score - Pretest\ score}{Maximum\ possible\ score - Pretest\ score} \quad (1)$$

(2) Then, categorise the gain score, as in Table 4 above:

Table 4: Interpretation of normalised gain score (g)

Normalised Gain Score	Category
$(< g >) < 0.3$	Low
$0.3 > (< g >) < 0.7$	Medium
$(< g >) > 0.7$	High

The data are then run through the SPSS application version 24 with several tests, namely the Kolmogorov-Smirnov normality test and the Levene homogeneity test. If the data are assumed to be normally distributed and homogeneous, then, the test is continued with the t-test (independent test). This test is to find out and check the effectiveness of the treatment. Figure 5 above shows the final roadmap of the research process.

Results

The results of this study include a gain test to see if there is an increase of students' understanding in solving environmental problems. This test uses pretest scores from disaster knowledge questions and post-test scores from environmental problem-solving questions from the experimental and control groups. To test the prerequisites for data analysis and hypothesis testing using post-test scores. The gain test was calculated by processing the average value of the pretest and post-test while the average value can be seen in Table 5, as follows:

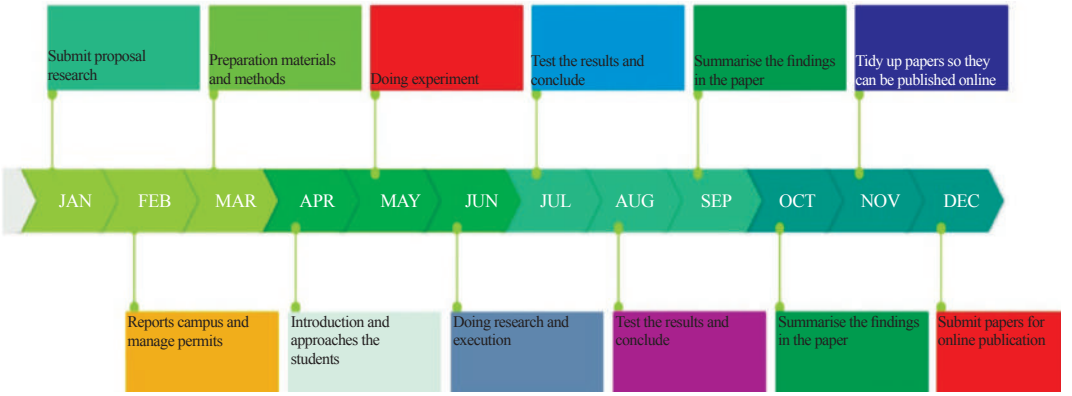


Figure 5: Finalisation of research roadmap
Source: Authors (2022)

Table 5: Average value results ($\bar{X}$)

Groups	$\bar{X}$	
	Pretest	Posttest
Experiment 1	12.40	17.30
Experiment 2	14.00	15.10

The results of calculating the normalised gain score for the experimental and control groups is as follows:

Experiment group 1

$$N\text{-}gain = \frac{17.30 - 12.40}{20.00 - 12.40} = 0.64 \quad (1)$$

Experiment group 2

$$N\text{-}gain = \frac{15.10 - 14.00}{20.00 - 14.00} = 0.18 \quad (2)$$

The results of the gain test calculations were compared with the normalised gain score (g), the student environmental problem-solving score in the experimental group was 0.64 g, this indicated that the experimental group was included in the high category. For the control group, it was 0.18 g, indicating that the control group was in the low category. The results of this calculation indicate that there are differences in students' understanding in solving environmental problems. These results will be consulted with the hypothesis test.

Pretest Data Analysis

The pretest data were tested for the normality of the two research groups. The experimental group obtained a value of 0.097 while the control group was 0.142, meaning that both data groups received a sig-count value > sig-table 0.05, this indicates that the data of the two groups were normally distributed. The homogeneity test obtained a sig-count value of 0.164, which was more than sig-table 0.05. It can be concluded that both data are homogeneous. The results of the pretest data are sufficient to continue the hypothesis test using the paired t-test. A sig-count value of 0.000 < sig-table 0.05 was obtained, then, Ho was rejected. This means there is a difference in students' understanding in reducing environmental problem solving between the experimental group students, who study disaster mitigation through video and control group students, who study disaster mitigation education using the BNPB pocket books. The results of hypothesis testing can be seen in Table 6.

Discussion

Based on the results of the average scores of environmental problem-solving questions, the experimental class that learned to use video got high marks, this proves that the use of disaster mitigation educational videos can provide clear

Table 6: Hypothesis test calculation results of independent samples test

	Leneve's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Internal of the Difference	
	F	**Sig.**	**T**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Score equal variances assumed	2.018	0.164	3.821	38	0.000	2.200	0.576	1.034	3.366
Score equal variances not assumed			3.821	34.893	0.001	2.200	0.576	1.031	3.369

information to students. Wu *et al*. (2024) said that video-based learning is vital for student understanding. Chen and Jiun (2023) affirm that video-based learning can foster more effective learning than text learning because videos can improve teaching and students gain basic ideas about the content. It can be interpreted that by using disaster mitigation learning media, students can explore in-depth environmental problems in the real world.

According to Liang and Liang (2023), global warming caused by burning fossil fuels has caused various environmental problems such as floods, heat waves, land degradation, loss of habitat, sea level rise, loss of biodiversity, and forest degradation. Experts say that the current global warming process is, in turn, driving climate change, which is the long-term changes in temperatures and weather patterns.

Activities in disaster mitigation measures would certainly involve environmental components for students to learn to resolve environmental problems resulting from natural disasters. According to Kim *et al*. (2024), adequate resource allocation is essential to ensure the success of mitigation measures. Mihardja *et al*. (2023) explained that disaster mitigation is designed in two structural ways: (1) Structural mitigation is an effort to minimise disasters by building various physical infrastructure and (2) non-structural mitigation is an effort to reduce the impact of disasters through policies and regulations.

Based on the opinions of the experts above, this research discusses the design of mitigation concepts in general, to increase knowledge of environmental education as an effort to reduce environmental problem solving due to natural disasters, which have an impact on economic, social, and environmental aspects. The researchers' efforts to solve environmental problems in these three aspects through the principles of mitigation are as shown in Table 7.

According to Beege *et al*. (2020), educational videos can more effectively convey verbal and visual information such as clearer pictures and objects. The disaster mitigation educational videos used in this study are adopted from YouTube. Cassidy *et al*. (2020) says that all videos are uploaded and archived to YouTube accounts. In this lesson, students are free to choose disaster mitigation videos to assist in solving the questions given. According to Farag *et al*. (2020), this is because YouTube provides a profitable educational content platform. In addition to videos from YouTube, students can get information on the inaRisk application, a product of the National Disaster Management Agency. The inaRisk application provides knowledge of disaster risk measures

Table 7: Ideas for solving environmental problems through mitigation principles

Aspect	Mitigation		Impact of Solving Environmental Problems
	Structural	Non-structural	
Economy	Industrial development in disaster safe areas	Implementing an environmentally friendly economy (Zheng *et al.*, 2022)	The wheels of the economy continue to run normally and maintain natural resources in a sustainable manner
Social	Building a balanced ecosystem by realising Society 5.0	Preserving socio-cultural life (Dhingra & Subrata, 2021)	Facilitate the sustainable development process
Environment	Designing the construction of building infrastructure, bridges, and others, based on the Lead Rubber Bearing system and build disaster (earthquake) resistant houses	Providing an understanding of disaster education to individuals or communities through school or social media (Harada *et al.*, 2023)	Can maintain state stability and build quality human resources with an environmentally friendly character

before, during, and after a disaster. These disaster mitigation steps involve environmental components, directly or indirectly, enabling students to also learn to complete environmental problem-solving tasks due to natural disasters.

Figure 6 shows the increase in natural disasters in Indonesia from 2018 to 2021. Implementation of disaster mitigation education in Indonesia ensures students are equipped with disaster knowledge and are prepared to go as volunteers into the community to assist disaster victims by following the steps that must be taken before, during, and after a disaster. These steps involve environmental components, so that students are directly involved in solving disaster environmental problems. Students here act as assistant officers to the government agency (BNPB), community elements, and the Red Cross. According to Bazo *et al*. (2019), the Red Cross is a world humanitarian organisation tasked with paying attention to climate information to support their work in disaster risk management. This is because environmental problem-solving must be carried out collaboratively. Regarding the implementation of disaster mitigation education, the researchers compiled collaborative environmental problem-solving activities as follows.

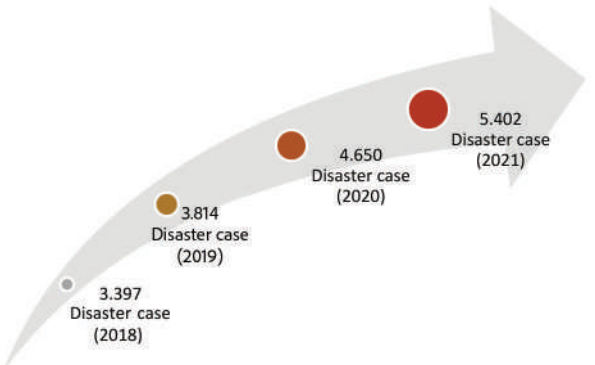


Figure 6: Increase in natural disasters in Indonesia (2018-2021)
Source: BNPB (2022)

Table 7 shows performance in disaster mitigation, it is revealed that solving environmental problems is part of disaster mitigation. According to Buchori *et al*. (2018a), structural mitigation focuses on physical construction to reduce or avoid the possible impact of hazards. In the case of a flood hazard, the traditional structural mitigation approach relies on physical infrastructure such as dams, embankments, and canals (Kotter, 2003). We advise that solving environmental problems due to disasters cannot be solved individually and all parties must collaborate. This is supported by Martono *et al*. (2019), who said that disaster management efforts must be a shared responsibility between government agencies, non-governmental organisations, and the community.

Figure 7 shows the step way on implementation management disaster education in Indonesia and their explanation can be seen in Table 8.

The context of solving environmental problems in this study is to be introduced to students through disaster mitigation education, so that they have an understanding of the concept of environmental problem-solving performance when they take on more responsibility in society.

Molnar and Samuel (2023) said that the use of knowledge to solve certain problems defines the knowledge application phase as the main problem-solving phase. According to Xu *et al*. (2022), to engage in problem-solving appropriately, individuals must first recognise a situation, understand its nature, and identify, plan, and implement potential solutions. This strategy has been shown by many previous studies that success in problem solving is largely determined by students' abilities.

To encourage students' abilities, Damoah and Bunmi (2022) argue that Environmental Education (EE) is a holistic learning process that aims to increase students' environmental literacy. In this discussion, Gebrekidan (2024) provides the view that environmental education is important for the younger generation and grassroots citizens to develop a cognitive framework for understanding issues related to nature, thinking about and interpreting environmental problems, and building awareness, talent, knowledge, and the mindset needed to start helping solve local problems or issues related to the environment. Based on the results of discussions and discussion from experts, we suggest that it is best to provide understanding in mitigating environmental problems resulting from disasters, so that the students can apply the principles of disaster mitigation directly (simulation) or vice versa.

However, it must be remembered that video media is only an intermediary tool, so the spearheads are still teachers and schools. For this reason, information technology training for teaching staff is necessary. Funding for intensive training and education for teaching staff must continue to be developed and improved, especially in the current era. Even though information technology has increasingly mastered all kinds of information and knowledge, teachers as teaching staff should not forget social, cultural, and ethical

Figure 7: Step way on implementation management disaster education in Indonesia

Table 8: Implementation of student learning management disaster process

Step Way	Explanations
Through activities	Youth Red Cross learning and activities through information in the inaRisk application and counselling from BNPB institutions
Targets	Students or millennial generation (Kamil *et al.*, 2020b), wide community (Mc William *et al.*, 2020)
Objective	Build student/individual or millennial generation and community preparedness in dealing with disasters (Loke, 2021)
Task	Help provide rescue and assistance to disaster victims (Setyawati *et al*., 2020) and cleaning up the environment (Cheng *et al*., 2021)
Action	1. Before the disaster - following disaster early warning information, - save goods or securities, - prepare food, drinking water, and medicines, and - if the disaster reaches a dangerous level, evacuate immediately
	2. During of disaster Students assist BNPB officers and the Red Cross to: - help disaster victims, - build refugee camps/public kitchens, and - prepare first aid kits and disaster management equipment (Buchori *et al*., 2018b)
	3. After disaster Participation of students, community, and cleaning staff, - clean up scattered trash, mud, or dust, and - clean the drains
Evaluation	After disaster management is complete and information is collected, officers will then assist them in making reports, which will be submitted to the local government (Chiang *et al*., 2020)

norms. The role of teachers must be not only to educate students but also to make them ethical and responsible human beings.

Conclusions

The results obtained from the Paired Sample t-test with a calculated sig-value of 0.000 < sig-table 0.05 based on the results of the hypothesis test found that there are differences in students' understanding in environmental problem solving. Based on the learning media (videos and disaster knowledge textbooks), the use of learning media based on disaster mitigation can make it easier for students to understand solving environmental problems resulting from disasters, which have an impact on social, economic, and environmental activities.

In the social sector, experts opine that maintaining the balance of the ecosystem is vital. In the economic sector, it is important to implement green economy mitigation. In environmental aspects, there needs to be environmentally friendly practices. The mitigation strategy in these activities is a start in reducing global warming, so that it can reduce environmental problem solving. The importance of disaster mitigation knowledge is learned by students at school by integrating it into science and social science subjects. This knowledge provides students with skills in environmental problem solving if at any time a disaster occurs, in addition to protect the environment in a sustainable manner. It is hoped that future disaster mitigation education strategies can also be further developed into the realm of Artificial

Intelligence (AI) to further increase students' understanding of environmental damage that exists everywhere.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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