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The Impact of The Virtual-Based Disaster Learning Model on Elementary Students' Understanding of COVID-19 Disaster-Learning

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Abstract: A virtual-based disaster learning model was created to enhance understanding of COVID-19 disaster mitigation following the characteristics of elementary school students because the high number of child deaths brought on by the COVID-19 pandemic served as the driving force behind this research. The virtual-based disaster learning model had been deemed valid, but more study is required to ascertain its impact on primary school pupils' comprehension of COVID-19 disaster mitigation. This study sought to determine how the virtual disaster learning model affected elementary school pupils' understanding of COVID-19 disaster mitigation. This study was a quasi-experimental investigation. Non-equivalent control group design was the type of experimental design employed. The t-test showed that students who studied using virtual-based disaster learning models and those who used conventional learning had different average levels of understanding of COVID-19 disaster mitigation. According to the findings, primary school children who learned using virtual disaster learning models had higher scores than students who used conventional methods. This finding revealed that virtual disaster learning models could improve understanding of COVID-19 disaster mitigation. The results of this study's implications can be applied as a different approach to enhancing elementary school kids' comprehension of emergency planning for COVID-19.

Keywords: *COVID-19, disaster, disaster mitigation, learning model, virtual.*

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Introduction

A type of non-natural disaster that affects the entire world community is the COVID-19 pandemic (Alim et al., 2020; Quigley et al., 2020). The COVID-19 epidemic has altered how the world community interacts and communicates. Governments are working hard to educate people about health precautions so that they will always follow them and help stop the COVID-19 virus from spreading. The administration has tried to communicate with the people as much as possible so that they may comprehend how this illness is spreading.

The COVID-19 virus is rapidly spreading. Facts revealed that practically all nations, including Indonesia, were impacted by this calamity (Djalante et al., 2020; Olivia et al., 2020). This non-natural tragedy affects every area of people's live and entire world. People must be able to maintain a safe distance from one another during this pandemic to stop the COVID-19 virus from spreading. The COVID-19 pandemic has influenced the economic and educational aspects (Miftode et al., 2021; Aristovnik et al., 2020; De' et al., 2020). Many nations are going through an economic crisis viewed from an economic perspective. Due to this pandemic, numerous government and non-government businesses have filed for bankruptcy (Dai et al., 2023; Weible et al., 2020). The education component has significantly impacted this pandemic. One of a nation's most important characteristics is its educational system. Proper management of educational issues is necessary to improve the stability of state life. However, the education system is not being implemented to its full potential because of the COVID-19 pandemic. Almost all governments have stopped face-to-face learning due to the COVID-19 outbreak (Al-Taweel et al., 2020). This act seeks to decrease direct social interaction, which is how COVID-19 is primarily transmitted.

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The data showed that the number of people confirmed to be COVID-19 in 2021, including children, increased significantly. 12.6% of Indonesians with COVID-19 confirmed in January 2022 were children. Of the 12.6%, 2.29% of these children were declared dead (Kusumaningrum et al., 2022). This number showed that children in Indonesia are a group of people who are vulnerable to being exposed to COVID-19, and what the researchers did was the cause of the high number of children in Indonesia exposed to COVID-19 due to children's lack of knowledge and understanding regarding the mitigation of the COVID-19 disaster (Babvey et al., 2021; Hikmawati & Setiyabudi, 2021).

The community must comprehend disaster mitigation (Kamil et al., 2020). Doing this will make the community better prepared for calamities, and the danger will decrease. Understanding COVID-19 disaster mitigation is also essential. Society education on COVID-19 catastrophe mitigation is required to be completed quickly (Mann et al., 2021). Information on COVID-19 disaster mitigation has been released to the public. However, developmental aspects should be covered in this information. The information provided is only intended for use by adults. Therefore, it is difficult for kids to process the information.

Adult development levels differ from those of children. In this context, elementary school students enrolled in the concrete operational time are considered children. Students must now learn from actual or relevant objects (Kenedi et al., 2019). Therefore, a COVID-19 disaster mitigation strategy that focuses on the developmental needs of elementary school pupils is necessary. For pupils in primary school, understanding COVID-19 disaster mitigation can be included. To better comprehend COVID-19 disaster mitigation, researchers are working to create a virtual disaster learning model.

Experts have designed and deemed this virtual disaster learning model feasible using the scientific method. This online learning approach uses a virtual disaster learning model to visualize the disaster mitigation procedure. Elementary school pupils can grasp disaster mitigation materials according to their characteristics even though learning is online without a direct teacher. However, this virtual-based disaster learning model has yet to be tested for effectiveness. Therefore, in this study, researchers looked at how well primary school pupils understood COVID-19 disaster mitigation using a virtual disaster learning model. This study has yet to be conducted. This is because the study team created this virtual-based disaster learning model for elementary school pupils to understand COVID-19 catastrophe prevention better. This study aims to determine the influence and impact of the virtual-based disaster learning model on understanding COVID-19 disaster mitigation. The virtual-based disaster learning model will be disseminated based on the findings of this study so that it can be used.

Literature Review

Virtual-Based Disaster Learning Model

Teachers use the learning model as a planning template to direct students' learning (Li et al., 2022). The learning model is a framework for learning that is used in the learning process and serves as a guide for accomplishing learning goals (Mendoza et al., 2022). The teacher must utilize learning models as it is a need. Teachers must be able to employ learning models following the characteristics of the pupils and the learning that will be done (Quadir et al., 2022). The achievement of learning objectives will be impacted by the learning model selected.

A virtual-based disaster learning model is the one employed in this study. This learning model was created by considering elementary school students' historical context and characteristics. This approach was created by considering the developmental traits of primary school pupils, including the need for kids to actively seek out knowledge and use their personal experiences as a source of learning. This disaster learning model is a virtualized combination of disaster learning models. This simulated disaster learning methodology has undergone rigorous testing. The theory underlying the learning model, its organizational structure, and its ultimate objective are all covered in the feasibility test. The virtual-based learning model was confirmed feasible to employ after conducting numerous validations.

In previous research, researchers have developed a digital module to improve the disaster mitigation abilities of elementary school students. In this study, researchers developed a digital module to improve the ability to mitigate the COVID-19 disaster. This module is the primary digital module adapted for elementary school students to reduce their exposure to COVID-19 (Arwin et al., 2022). However, the drawback of this research is the need for a learning model that can support the implementation of learning that aims to increase understanding of COVID-19 disaster mitigation. This research is expected to support this. Then the research was conducted by Juhadi et al. (2021), who developed a disaster mitigation learning model based on local wisdom. In this research, a disaster mitigation learning model was developed with a regional cultural approach. This model effectively increases the literacy skills of junior high school students in disaster mitigation. However, this research was not developed for elementary school students. Then the research was conducted by Triastari et al. (2021), who also focused on increasing literacy in earthquake and flood disaster mitigation so that it becomes a different matter from research that researchers are concerned with developing virtual-based disaster mitigation learning models for elementary school students according to the level of student development. Then the research was conducted by Rusilowati et al. (2021), who developed an integrated disaster mitigation model using the MIKIR approach. The results of this study stated that this model increased the self-efficacy and preparedness of high school students. However, this research is inappropriate for use in elementary schools because it needs to follow the

development level. Therefore, the virtual-based disaster learning model in increasing understanding of COVID-19 disaster mitigation is new research and can be used as a new reference and has an overall impact.

Understanding COVID-19 Disaster Mitigation

A type of non-natural disaster is COVID-19 (Suprapto et al., 2022). In March 2020, COVID-19 was classified as a pandemic. Numerous losses and perhaps fatalities have been caused by the COVID-19 epidemic. The COVID-19 epidemic significantly influences almost every country (Kumar et al., 2020). Understanding COVID-19 catastrophe mitigation is essential to raising awareness and lowering risk due to the COVID-19 pandemic's significant effects on children.

The ability to grasp the relationships between variables, concepts, principles, facts, causal relationships, and conclusions connected to efforts to lessen the impact of the COVID-19 disaster is known as understanding COVID-19 disaster mitigation. This comprehension is attained through readiness, vigilance, and various skills to withstand calamities that happen naturally or are created by humans and are conveyed in their native tongue (Purba et al., 2022).

Understanding of COVID-19 disaster mitigation is generally divided into 3 parts, namely (Baga et al., 2022):

1. Understanding of the translation. We are translating things through one's language is how to understand this translation. This skill falls under the headings of (a) translating something from an abstract to a concrete form and (b) translating charts, tables, symbols, etc.
2. Understanding of interpretation. Understanding this interpretation involves connecting the previously understood material to the newly presented material. This skill falls under the following categories: (a) determining which conclusions are necessary and which are not; (b) comprehending the overall structure of a position; (c) understanding and interpreting the contents of various types of reading.
3. Understanding of extrapolation. Understanding extrapolation involves being able to predict and infer. This skill is broken down into the following categories: (a) inferring and stating more explicitly; (b) predicting the various outcomes of actions that will be described from a communication; (c) being attentive to circumstances that might make predictions correct.

For elementary school children, these three understandings indicate how well they comprehend COVID-19 disaster mitigation. This indicator will be developed into an instrument that experts validate.

Methodology

Research Design

This study was quasi-experimental. Non-equivalent control group design was the type of experimental design employed. Up to 200 primary school pupils between the ages of 7 and 10 participated in this study. Of the 200 students, 105 were male, and 95 were female. The research subjects were students who were in border areas in the city of Padang, Indonesia, which was an area that had been heavily affected by the COVID-19 disaster. The experimental class included 100 students, while the control class included 100. The table below showed how this study was designed:

Table 1. Research Design

Group	Pre-Test	Treatment	Post-Test
Experiment	O_1	X	O_2
Control	O_3		O_4

Annotation

- X: The application of a virtual-based disaster learning model
- O_1: Pre-test (Understanding of COVID-19 disaster mitigation before using a virtual-based disaster learning model)
- O_2: Post-test (Understanding of COVID-19 disaster mitigation after using a virtual-based disaster learning model)
- O_3: Pre-test (Understanding of COVID-19 disaster mitigation before using conventional models)
- O_4: Post-test (Understanding of COVID-19 disaster mitigation after using conventional models).

The teacher supported students in the experimental class using a virtual-based disaster learning model. In contrast, in the control class, the teacher used conventional learning to provide an understanding of COVID-19 disaster mitigation. After being given 12 treatments, a measurement of the understanding of COVID-19 disaster mitigation was carried out.

Procedure

This study involved two classes, namely the control and experimental classes. The control class was a class that carried out the learning process using conventional methods. In contrast, the experimental class was a class that carried out the learning process using a virtual-based learning model. Each class was given the same material about the COVID-19 disaster, including an introduction to COVID-19, understanding the symptoms of COVID-19, the causes of the symptoms of COVID-19, prevention of the spread of COVID-19, treatment when exposed to COVID-19 and the process of action after exposure to COVID -19. Classroom control students and teachers were instructed to learn about disaster management using conventional learning models. In the control class, the teacher learned using conventional models such as applying the lecture method, the question, and answer method, and the discussion method. At the beginning of the activity, the teacher explained to students about the COVID-19 disaster.

The teacher displayed pictures or videos to connect student knowledge. Students were asked to observe the pictures and videos displayed by the teacher. Then the teacher answered, asking about the relevance of the pictures and videos to the conditions of the problems faced. Students were also free to answer teacher questions or ask questions regarding the resulting images/videos. The teacher asked students to sit in groups and gave students worksheets containing problems that students must discuss. Students in groups discussed each other regarding the problems given. At the end of the activity, students were allowed to show their findings, and other groups gave feedback to each other in class control. Teachers had an essential role as executors of learning. The teacher was the primary learning resource so students could understand the material discussed. At the same time, researchers in the control class acted as observers in observing the progress of the learning process following the lesson plan that had been prepared.

Initial instructions in the experimental class were called problem observations. In this stage, the teacher gave problems related to the disaster. Teachers could present this problem by providing a virtual COVID-19 disaster. At this stage, students were asked to observe the Visualization of the problem and identify what disaster occurred and its impact on the environment. This stage was the main characteristic of this study. The teacher provided a means in the form of Visualization, or VR/AR, which was the main trigger for students to understand the problem. This treatment was the main differentiator in the control class. So that students could feel their presence virtually in the problems they faced. This activity would make it easier for students to understand the problems they face. Then learning went into the next stage of organizing the problem. After students identified disaster problems from virtual activities, students in groups organized the problems. The teacher facilitated students in organizing the results of observations with predetermined learning objectives jointly. The next stage was the stage of finding a solution. At this stage, the teacher asked students to find solutions to the problem identification process. Students were guided to be able to find appropriate solutions to problems. Students could find solutions to problems from other learning resources such as libraries, the internet, etc. After that, it comes to the stage of communication. At this stage, students were asked to convey their findings to colleagues, and the teacher facilitated students' discussions with each other. In the experimental group, the teacher had an essential role as a facilitator. Teachers should facilitate students in implementing this virtual learning model. At the same time, researchers in the experimental class acted as observers in observing the implementation of the learning model following the lesson plan that had been prepared. At the end of the study, researchers and teachers would reflect on the learning that has been implemented. After being given different treatments between the control and experimental classes with the same material or problem, at the end of the activity, a measurement of students' understanding of disaster mitigation was carried out. After the measurement was carried out, the following calculation was carried out.

Sample and Data Collection

Elementary school students' understanding of COVID-19 disaster mitigation was assessed using 35 multiple-choice test questions modified to match indicators of disaster mitigation comprehension. The test questions were developed based on indicators. The test questions developed were tested for content validity by experts and tested for the contract's validity using the moment product correlation formula. The results of the content validity test stated that the questions were valid and feasible to use. In contrast, the contract validity test found that the r count for each item was more significant than the r table, so it was declared valid. Furthermore, the reliability test was carried out to obtain a value of .923, meaning that the reliability level of the item was very high.

Analyzing of Data

The SPSS 26 application, which included descriptive statistical tests, normality tests, homogeneity tests, paired sample t-tests, and independent t-tests, was used for data analysis. The normality test was a prerequisite test before measurement. The normalization test results could be seen in the following table:

Table 2. Normality Test

Tests of Normality	Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Understanding of COVID-19 disaster mitigation.	Experimental pre-test	.258	100	.140	.815	100	.070
	Experimental post-test	.126	100	.120	.957	100	.065
	Control pre-test	.292	100	.230	.745	100	.060
	Control post-test	.258	100	.070	.734	100	.070

a. Lilliefors Significance Correction

Table 2 showed that every class received a sig value > .05. This value showed that the distribution within each class was normal.

Findings / Results

In this study, the teacher acted as the implementer of learning, while the researcher acted as an observer. Before starting, the teacher and the researcher designed the learning to ensure the learning was following the concept. The research began by giving each class a treatment. The control class was given conventional learning treatment, while in the experimental class, students were given treatment using a virtual-based disaster learning model. Each control class and experimental class would be given learning about COVID-19 starting from the introduction of COVID-19, understanding the symptoms of COVID-19, the causes of the symptoms of COVID-19, prevention of the spread of COVID-19, treatment when exposed to COVID-19 and the post-action process. exposure to COVID-19. Each teacher taught the material in the experimental class and control class. However, in the control class, the teacher presented the concept conventionally. This concept meant that the teacher only explained the problem directly to students. The teacher presented learning using a visual-based learning model in the experimental class.

During the learning process, the researcher observed the learning carried out by the teacher and whether it was following the agreed design. At the end of each lesson, the teacher and researcher reflected on the learning that had been carried out. At the end of the meeting, a measurement of understanding of COVID-19 disaster mitigation was carried out for both the control and experimental classes.

The next step was to analyze the data after each class had been given treatment. To make the data easier to process, the data must first be tabulated before the analysis can begin. The data tabulation's findings were as follows:

Table 3. Recapitulation of Control Class and Experimental Class

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Experimental class pre-test	100	46	57	49.26	2.736
Experimental class post-test	100	77	100	88.07	5.400
Control class pre-test	100	46	57	48.93	2.438
Control class post-test	100	49	54	50.37	1.390
Valid N (listwise)	100				

Table 3 above showed the primary data for the four classes that have been assessed. The following stage would include processing this data. A normality test was performed to determine whether the data acquired were regularly distributed. Table 2 showed that every class received a sig value > 0.05. This value showed that the distribution within each class was expected. The paired sample t-test came next. To determine the difference in the average of two paired samples, a paired sample t-test was performed. This test intended to determine whether the virtual disaster learning model influenced elementary school pupils' understanding of COVID-19 disaster mitigation. The following were the outcomes of the paired sample t-test:

Table 4. Calculation Results of Paired Sample T-Test

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean Difference	Std. Dev	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Experimental Pre-Test - Experimental Post-Test	-38.810	6.045	.604	-40.009	-37.611	-64.204	99	.000
Pair 2	Pre-Test Control - Post-Test Control	-1.440	1.914	.191	-1.820	-1.060	-7.524	99	.000

Table 4 in pair 1 shows that the value of sig (2-tailed) was less than 0.05. This value indicated a difference between the experimental class's average pre-test and post-test regarding the students' comprehension of COVID-19 catastrophe mitigation. According to pair 2, the value of sig (2-tailed) was less than 0.05. This value indicated a difference between the control class's pre-test and post-test averages on their knowledge of COVID-19 disaster mitigation for primary school kids. Then from the mean difference column, the mean difference was 38.810, while in pair 2, it was 1.140. This result revealed that virtual-based disaster learning models had a more significant impact than ordinary learning. Furthermore, from pair 1, the effect size could be determined by measuring the coefficient of determination to know how much influence the virtual-based disaster learning model has on understanding disaster mitigation. The results of these calculations could be seen in the following table:

Table 5. The Coefficient of Determination

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.850[a]	.723	.714	.92200

Predictors: (Constant), X

From table 5, the coefficient of determination was 85.00%. This showed that 85.00% of the understanding of COVID-19 disaster mitigation was determined by the virtual-based disaster learning model, while the remaining 15.00% was influenced by other unidentified factors. To ascertain whether the experimental class post-test and control class post-test were homogeneous or not, the homogeneity test was next conducted. The following table shows the results of the homogeneity test:

Table 6. Homogeneity Test Table

Test of Homogeneity of Variance					
		Levene's Statistic	df1	df2	Sig.
Understanding of COVID-19 disaster mitigation.	Based on Mean	114.393	1	198	.230
	Based on Median	97.278	1	198	.640
	Based on Median and with adjusted df	97.278	1	121.937	.315
	Based on trimmed mean	114.685	1	198	.209

Table 6 showed that the significance value based on the mean was .230 > .05. This value demonstrated the homogenous variance of the two data. After that, the independent sample t-test was run. This exam aimed to determine whether primary school pupils who studied using a virtual disaster model and those who learned using traditional learning methods had different understandings of COVID-19 disaster mitigation. The following table displays the test results:

Table 7. Independent Sample T-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Understanding of COVID-19 disaster mitigation.	Equal variances assumed	114.393	.000	67.614	198	.000
	Equal variances not assumed			67.614	112.066	.000

Table 7 showed that the sig value (2-tailed) was less than .05. This value indicated a difference between primary school students who studied using virtual-based disaster learning models and those who learned using conventional learning models. The following information presented an understanding of the significant COVID-19 disaster mitigation:

Table 8. The Average Post-Test Results for The Experimental Class and The Control Class

Group Statistics					
	Class	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Understanding of COVID-19 disaster mitigation.	Experimental class Post-Test	100	88.07	5.400	.540
	Control class Post-Test Class	100	50.37	1.390	.139

Table 8 showed that the average value of understanding of COVID-19 disaster mitigation for primary school students in the experimental class was higher than that for students in the control class. This value demonstrated that virtual disaster learning models could help people better comprehend COVID-19 catastrophe mitigation.

Discussion

According to the study, the virtual disaster learning model improved primary school students' COVID-19 disaster mitigation skills. The study findings by Putra et al. (2021), which found that a disaster mitigation curriculum had been created, supported the findings of this study. This curriculum was created for extracurricular and curricular learning. According to the study findings, Indonesian primary school children had improved disaster response skills using this curriculum. However, the findings were different from the results of this research. Putra's research supported efforts to increase disaster mitigation. However, the increase in disaster mitigation must be implemented in the learning process to develop an appropriate learning model. The findings of this study stated that a virtual-based disaster mitigation learning model had been developed to increase the ability to mitigate the COVID-19 disaster. This was a notable finding that no learning model was intended to develop an understanding of COVID-19 disaster mitigation.

According to research by Astawa et al. (2022), students in high school could develop their critical thinking abilities and self-efficacy in disasters by using visualization-based flipped learning. Astawa's research suggested they have developed a visualization-based flipped learning system for high school students. However, flipped learning for elementary school students must consider several factors. One of them was the existence of special assistance and internet availability. Teachers must also be able to accompany students when learning from home and school. Therefore, using flipped learning for elementary school students needed deeper study. In addition, in this study, the development of learning models was intended to increase students' critical thinking skills and efforts to increase self-efficacy. The findings were different from this study. This study used a virtual-based disaster mitigation learning model. This model was used directly by teachers and students. So that teachers could accompany students in implementing this learning model. In addition, this learning model followed the level of student development and the developmental characteristics of elementary school students. The material presented was adapted thoroughly to increase understanding of COVID-19 disaster mitigation.

According to research by Sumarmi et al. (2020), the experiential learning paradigm was more effective at enhancing high school students' capacity for disaster response. Experiential learning is learning that is contextual, so this learning is also appropriate for use in elementary schools. However, experiential learning has yet to combine the use of technology. So it needed to follow the demands of the 4.0 era. In addition, this experiential learning model was used to increase natural disaster mitigation. The findings differed from the research that the researchers carried out, namely using a virtual-based disaster mitigation learning model under the development of the 4.0 era because it used technology elements. In addition, using experiential learning to mitigate non-natural disasters such as COVID-19 was hazardous to implement in elementary schools. According to research was done by Noviana et al. (2020), using komik anak sekolah (KOASE)/ comics for primary school children improved students' awareness of the disaster process. This study used KOASE's comic suggestions to improve understanding of the disaster process for elementary school students. The use of comics was very appropriate for elementary school students. Students loved things related to pictures and colours. In addition, this study used a virtual-based disaster mitigation learning model, which would be even more interesting for students because it utilized elements of technology in it. Besides that, abstract non-natural disaster mitigation, such as COVID-19, was easy to learn using this system.

Another study by Sumarmi et al. (2021) found that using e-modules in the blended learning process for learning about disaster response could improve student readiness. Blended learning is one type of learning per the characteristics of the 4.0 era. However, the use of blended learning for elementary school students must pay attention to the readiness of teachers and students to implement it. This was categorized as blended learning, which required optimal internet access. At the same time, the object of this research was elementary school students in suburban areas with unstable internet coverage. Therefore, the use of blended learning needed to be reviewed again. This study used a virtual-based disaster mitigation learning model. Teachers and students could use this model without having to access the internet. In addition, this study aimed to determine the effect of the virtual-based disaster mitigation learning model on understanding COVID-

19 disaster mitigation. It was clear from the earlier studies that the focus of current calamity research was the influence of technology-based learning processes on disaster response skills. The virtual-based disaster learning model used by primary school children was successful in raising students' understanding of disaster mitigation, which led to various conclusions in this study.

Compared to children in other educational levels, elementary school students go through different developmental stages (Hamimah et al., 2019; Kenedi et al., 2019). At the elementary school level, lessons must be contextualized and based on actual items. The learning process must also be based on the students' direct experiences. Teachers and parents must be able to adapt the curriculum to the level of knowledge of primary school pupils to help kids better grasp the COVID-19 disaster.

One of the worst pandemics ever was COVID-19. The COVID-19 pandemic has significantly impacted almost everyone on the planet. Even death may result from the impact. Age is not a factor in COVID-19 pandemic deaths. The COVID-19 epidemic has also affected parents and children. The failure to inform children about disaster preparedness procedures led to this death. Numerous communities have offered a wealth of information, but it was unsuitable for youngsters. Due to the lack of relevant information about COVID-19 disaster mitigation for elementary school-aged children, researchers have created a virtual disaster learning model to enhance elementary school student's understanding of COVID-19 disaster mitigation. This study demonstrated that based on measurements taken, the virtual-based disaster learning model helped strengthen the ability of primary school children to mitigate the COVID-19 disaster. This model has been validated by experts and was certified feasible for deployment.

Various factors contributed to elementary school students' understanding of COVID-19 disaster mitigation. The virtual-based disaster learning model was developed by considering the primary issues faced by children. The main issue here was that many elementary school pupils died because they did not understand how to mitigate COVID-19 disasters. This situation was the primary concept behind creating this virtual disaster learning approach. This strategy was created primarily to address primary school pupils' poor comprehension of COVID-19 disaster mitigation. This strategy was in line with the viewpoints of Yuan et al. (2020), Andriyani and Suniasih (2021), and Chiu et al. (2021), all of which asserted that it was essential to focus on the primary issues while creating a learning model. For the learning model to be successful, the model must be built following the backgrounds of the existing problems. This virtual-based disaster learning paradigm was also created with a specific goal. This learning model was established by considering the aspects that could improve the mitigation of the COVID-19 disaster for elementary school students with a focus on enhancing elementary school student's understanding of COVID-19 disaster mitigation. This situation was supported by the views of Rasmitadila et al. (2021), Simanjuntak et al. (2022), and Shuell (2021), who asserted that while designing a learning model, it was necessary to adapt it to the goals that must be attained in terms of learning. The steps in the disaster learning model based on virtual situations were built logically, coherently, and systematically. The procedures in this virtual disaster learning paradigm included problem identification, information gathering, virtual key information presentation, solution discovery, and best solution communication. This stage was arranged by paying attention to the logic of the learning process. The stages were also organized according to how they related to one another, allowing the learning process to be tailored to achieve the desired objectives.

Additionally, students' procedures were organized clearly, so they could carry out a learning process that would enhance their comprehension of COVID-19 disaster mitigation. This procedure was consistent with the claims made by Kwangmuang et al. (2021), Mandasari and Wahyudin (2021), and Andriyani and Suniasih (2021), all asserted that a learning model must focus on the logical components, which were simple to comprehend and connected. The virtual-based disaster learning model also incorporated contextual learning. Therefore, it was appropriate for elementary school children. In this approach, students were challenged to develop solutions to problems from virtually real scenarios directly related to the original COVID-19 data. Students today chose the virtual learning process, a modern learning method. This situation was because contemporary pupils genuinely enjoy using technology to learn. This condition was consistent with Rezeki et al. (2021), who believed that contextual learning could enhance student learning, and McGovern et al. (2020), who believed that using technology in the learning process could enhance learning. This finding showed why elementary school children could use a virtual disaster learning model to deepen their grasp of COVID-19 disaster mitigation.

Conclusion

The results of the study found a difference in the average understanding of COVID-19 disaster mitigation among elementary school students between those who studied using the virtual-based disaster learning model and those who learned using conventional learning models. Students who learned to use the virtual-based disaster learning model significantly understood COVID-19 disaster mitigation. This proved that using a virtual-based disaster learning model effectively increased understanding of COVID-19 disaster mitigation.

Recommendations

This study recommends that there is a need for adequate technological preparation for students. This learning process uses technology that has high specifications. Therefore, the teacher must be able to ensure that students have it. This study suggests that this virtual-based learning model is not only tried for elementary school students but also students at other educational levels to see the usefulness of this learning model.

Limitations

The limitation of this research is that the sample used could be more optimal, so it is necessary to expand the sample. In the research process, many students are constrained by signal networks, so they need more time in the research process.

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Authorship Contribution Statement

Arwin: Conceptualization. Kenedi: Design, analysis and writing. Anita: Editing. Hamimah: Reviewing. Afrian: Supervision.

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