International Journal of Elementary Education
Volume 7, Number 4, Tahun 2023, pp. 576-585
P-ISSN: 2579-7158 E-ISSN: 2549-6050
Open Access: https://doi.org/10.23887/ijee.v7i4.67651

SETS (Science, Environment, Technology, and Society) Based Disaster Learning on Elementary School Students' Disaster Literacy and Resilience

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ARTICLE INFO

Article history:
Received July 12, 2023
Accepted November 04, 2023
Available online November 25, 2023

Kata Kunci:
Model Kebencanaan, SETS, Literasi Bencana, Resiliensi Bencana

Keywords:
Disaster Models, SETS, Disaster Literacy, Disaster Resilience

ABSTRAK

Penelitian ini dilatarbelakangi oleh literasi dan resiliensi siswa terhadap bencana yang masih tergolong rendah. Penelitian ini bertujuan untuk menganalisis dampak model pembelajaran kebencanaan berbasis SETS terhadap literasi dan resiliensi bencana siswa kelas V sekolah dasar. Metode yang digunakan dalam penelitian ini adalah eksperimen kuasi dengan desain non-equivalent control group. Literasi dan resiliensi dikumpulkan dengan pemberian angket kepada siswa kelas V sekolah dasar. Subjek yang terlibat terdiri dari 2 kelas eksperimen berjumlah 74 orang siswa dan 2 kelas kontrol yang berjumlah 88 orang siswa. Teknik pengumpulan data menggunakan metode angket, dengan instrumen yang diuji validasi dan reliabilitas instrumen. Pengumpulan data yang digunakan yaitu metode angket, dengan instrumen yang diuji validasi dan reliabilitas instrumen. Teknik analisis data menggunakan uji analisis deskriptif, uji normalitas, uji homogenitas dan uji hipotesis yakni Multivariat Analisis of Variance (Manova). Hasil penelitian menunjukkan bahwa terdapat perbedaan yang signifikan literasi dan resiliensi bencana antara siswa yang belajar dengan menggunakan model pembelajaran kebencanaan berbasis SETS dengan siswa yang belajar dengan model pembelajaran konvensional sehingga dapat disimpulkan bahwa model pembelajaran kebencanaan berbasis SETS memberikan dampak yang positif terhadap literasi bencana dan resiliensi siswa kelas V sekolah dasar.

ABSTRACT

This research is motivated by students' literacy and resilience to disasters, which are still relatively low. This study aims to analyze the impact of the SETS-based disaster learning model on disaster literacy and resilience of grade V elementary school students. The method used in this research is a quasi-experiment with a non-equivalent control group design. Literacy and resilience were collected by giving fifth-grade elementary school students questionnaires. The subjects involved consisted of 2 experimental classes totaling 74 students and 2 control classes totaling 88 students. The data collection technique used the questionnaire method, with the instrument tested for validation and instrument reliability. The data collection is the questionnaire method, with instruments tested for validation and reliability. Data analysis techniques used descriptive analysis tests, normality tests, homogeneity tests, and hypothesis testing, namely, the multivariate analysis of variance (Manova). The results showed that there was a significant difference in disaster literacy and resilience between students who studied using the SETS-based disaster learning model and students who studied with conventional learning models, so it can be concluded that the SETS-based disaster learning model has a positive impact on disaster literacy and resilience of grade fifth elementary school students.

1. INTRODUCTION

Indonesia is one of the countries that has a fairly high level of natural disaster vulnerability (Hadi et al., 2019;Nazaruddin, 2015;Khusna et al., 2023). For example, the earthquake that occurred in several regions of Indonesia, whether accompanied by a tsunami or not, shows that natural disasters are a real threat faced by the Indonesian people (Yulianto et al., 2021). Disaster risk does not just happen once, but has become an ongoing daily condition (Börner, 2023; Yulianto et al., 2021). Based on data held by the National Disaster Management Agency (BNPB) which was reported on the page dibi.bnpb.go.id, it is stated that during 2019 from January 1 2019 to September 30 2019 there were 2,102 natural disasters throughout Indonesia. The most intense incidents were 725 tornadoes, 549 landslides, 549 floods, 248 forest and land fire disasters, the rest was divided into other disasters such as 15 earthquakes, disasters tidal waves/abrasion 7 times, floods and landslides 5 times, and volcanic eruptions 4 times (Rahmat et al.,

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2020). From these natural phenomena, it can be proven that Indonesia is a country that is prone to natural disasters.

The emergence of disaster events that occur in Indonesia, such as earthquakes, tsunamis and landslides, must be taken seriously by various parties to minimize the impact of losses caused by these disasters (Börner, 2023; Irawan et al., 2022; Yulianto et al., 2021). One way to increase community preparedness is by increasing the community's disaster information literacy skills. Disaster literacy or what could be called community awareness efforts in dealing with a disaster is certainly very important for the community to have. This is done in order to mitigate a disaster. Disaster information literacy factors are divided into four parts, namely knowing sources of disaster information, evaluating disaster information, organizing disaster information, and utilizing and conveying disaster information (Labudasari & Rochmah, 2020;Afrian & Islami, 2019). The complexity of disaster problems requires careful organization or planning in overcoming them, so that they can be implemented in a directed and integrated manner. Based on data obtained from BPBD DIY and the large amount of damage caused by natural disasters, it can be concluded that the preventive or precautionary measures taken so far have not been optimal. Disaster management is not optimal because so far the disaster management activities carried out have not been based on systematic and planned steps, so that there is often overlap and there are even important steps that are not handled properly. This can be seen from the lack of training on disaster mitigation as shown by the results of interviews and distribution of questionnaires in Karanggayam Village, Pleret District, Bantul Regency, showing that >80% of the community does not have good knowledge of earthquake disasters and their mitigation efforts.

As a concrete example, people who do not know the sources of disaster information will be very confused about what types of disasters might occur in their area, and how to face and overcome them. This disaster event will continue and repeat itself to form a cycle of earthquake return periods in a certain area. If you look closely at the historical facts of the Yogyakarta earthquake, for a long time the Bantul area was the area that always experienced the most severe damage every time an earthquake occurred (Atmojo, 2020). This kind of natural condition is a reality that must be accepted by the people of Bantul, so whether they like it or not, residents who live in active seismic areas have to face all of this. Therefore, an understanding of disaster management needs to be understood and mastered by all levels of society, government and the private sector to reduce as little as possible the number of fatalities and property losses that may arise if an earthquake occurs. There is a "damage belt" phenomenon whose distribution pattern corresponds to the most vulnerable zone which includes the Pundong, Imogiri, Jetis, Pleret, Banguntapan and Piyungan subdistricts. Socialization at an earlier age and types of lessons that touch directly on natural phenomena, such as science, are very strategic to implement because these two things have not been done much by teachers and school officials. Therefore, to increase disaster literacy and resilience, a disaster learning model is needed that is appropriate to the characteristics of elementary school students and can be implemented in schools completely and in accordance with the needs of disaster-prone areas.

The large number of disaster-prone areas in Indonesia and the importance of increasing disaster risk reduction efforts are a strong foundation for the Indonesian people to jointly implement these efforts in an integrated and directed manner. As educators, researchers will contribute to increasing society's understanding of disasters, through integrated learning in themes consisting of several teaching subjects in elementary schools. The SETS-based disaster learning model is an alternative to instilling concepts and increasing disaster literacy and resilience in elementary school students. The concept of natural disasters will be easy to understand if explained using the SETS-based natural disaster learning model, namely the integration of science, environment, technology and society. Through this model, students will understand disaster material and literacy so that they are skilled in taking action before a disaster, when a disaster occurs, and after a disaster ends in their environment. The SETS approach emphasizes the concepts and processes used to identify and solve problems (Lestari et al., 2020;Lestari et al., 2021;Hayati et al., 2019). In addition, the SETS approach is closely related to science process skills (Wati et al., 2022;Widiyanto, 2022). The SETS approach provides provisions for students to be ready to face problems in their environment. Students' ability to care and be active in solving problems is one of the focuses in learning activities (Budiarti et al., 2016; Ragil & Sukiswo, 2011). This SETS base was also chosen because it combines four elements, namely science, environment, technology and society so that through this learning students will gain comprehensive knowledge about natural disasters including disaster literacy skills and disaster resilience.

SETS-based disaster learning provides disaster learning that is delivered specifically, structured and integrative. This is in line with the opinion of other researchers who state that providing information and knowledge about disasters must be taught through learning that is different from ordinary learning (Amaliya et al., 2011). Increased disaster literacy occurs due to student involvement during the learning

process. It should be noted that one of the principles of learning is experiencing it yourself, meaning that students who do it themselves will gain optimal mastery of the concept of disaster material (Novak et al., 2019;Kimura et al., 2017;Ronan et al., 2015). In learning that uses the SETS-based disaster learning model, students are actively involved in learning so that they have better mastery of disaster material than students who study disaster conventionally.

Disaster learning in this research will be used to improve students' disaster literacy which also improves students' literacy, however in this research it uses a SETS basis while in previous research it uses an integrated basis of STEM (Science, Technology, Engineering, Mathematics) and Disaster (STEM-D) which shows that with disaster literacy, students can analyze Indonesian natural phenomena related to disasters and find solutions (Sampurno et al., 2015). This disaster learning model was designed by combining elements of science as the main element in learning. This science element functions to equip students with sufficient knowledge about natural disaster phenomena from a scientific perspective. Environmental elements play a role in showing students how to adapt when environmental conditions occur when a disaster occurs. The technology element is to provide provisions regarding technology to detect disasters so as to generate appropriate responses. The society element provides knowledge on how to adapt to respond to disasters together with the community. With the characteristics of the SETS model, students are better able to understand the concept of disasters and mitigation efforts. Through this model, elementary school students will be able to understand disaster material and disaster mitigation efforts before a disaster, when a disaster occurs, and after a disaster ends in their environment. This research aims to analyze the impact of the SETS-based disaster learning model on disaster literacy and resilience in fifth grade elementary school students.

2. METHOD

This research is classified as a quasi-experimental type of research with a non-equivalent control group design. This research consists of an experimental class that uses a SETS-based disaster learning model and a control class that uses a conventional learning model. The population is class V elementary school in Bantul Regency. The sampling technique uses purposive cluster random sampling, namely random selection of samples from classes that have been determined with certain characteristics and criteria to obtain the results and objectives of this research. The subjects used in this research were four classes consisting of 2 experimental classes totaling 74 students and 2 control classes totaling 88 students. Data collection in this research used the questionnaire method, with instruments in the form of questionnaires/questionnaires which were tested for validation and reliability of the instruments. The questionnaire grid regarding resilience and disaster literacy can be seen in Table 1.

Table 1. Disaster Resilience and Literacy Instrument Grid

No	Disaster Resilience Aspect	No	Disaster Literacy Aspect
1	Skills to adapt to disaster-prone environments	1	Recognize the scientific meaning of disaster
2	Skills in focusing on disaster events that occur	2	Prediction of disasters
3	Clear thinking skills in disaster events	3	Mapping the radius of disasters and casualties
4	Make the right decisions during pre-disaster, during disaster and post-disaster	4	Adapt to disaster-prone environments
5	Able to get out of disaster situations and difficulties	5	Disaster prevention and impact
6	Rebuilding mental and environmental conditions after a disaster	6	Get out of the predicament of disaster

Testing the validity of the instrument was carried out using expert assessment which was declared valid and revised, then the instrument was tested on 30 fifth grade elementary school students who had the same criteria as the school where the research was conducted, after that a validity test was carried out using a validity test. The product moment correlation with the results of all items is declared valid and reliable. The research steps were: students in the experimental class and control class were given a pretest first, after that the experimental class was given learning treatment using the SETS vision disaster learning model and the control class used a conventional approach, after being given learning each experimental class and control class were given post-test. After that, the pre-test and post-test data were analyzed using descriptive analysis techniques and inferential statistical analysis techniques using

the Multivariate Analysis of Variance (Manova) test. Before conducting a hypothesis test, there are several requirements that must be met and need to be proven.

The requirements in question are; (1) the data analyzed must have a normal distribution and (2) know that the data analyzed is homogeneous. These two prerequisites must be proven first, so to fulfill this, an analysis prerequisite test is carried out by carrying out a normality test and a homogeneity test. The normality test uses SPSS 24.00 with the Kolmogorov Smirnov statistical test at a significance of 0.05. Meanwhile, testing the homogeneity of variance in this research was carried out using Levene's Test of Equality of Error Variance with the help of SPSS via the Box's M test. Testing of the three hypotheses was carried out using Multivariate Analysis of Variance (Manova). Hypotheses 1 and 2 were carried out using the F variant test through Manova analysis using the Test of Between Subject Effects with the testing criteria for a significance level of F = 5%, assisted by SPSS 28.00 for windows. Meanwhile, hypothesis 3 was carried out using the F test through decisions taken using the Pillae Trace, Wilk Lambda, Hotelling's Trace, Roy's Largest Root analysis, with a significance level testing criterion of F = 5%. If the calculated F significance number is less than 0.05 then the null hypothesis is rejected and H_a is accepted.

3. RESULT AND DISCUSSION

Result

In this research there are 3 variables, namely; (1) The independent variable (X) is a disaster learning model based on SETS (Science, Environment, Technology, and Society); (2) Dependent variable 1 (Y1) namely disaster literacy and (3) Dependent variable 2 (Y2) namely disaster resilience. This research data consists of posttest data from the experimental group and the control group. The experimental group data consisted of 74 students and the control group consisted of 88 students. Based on the results obtained, research data was obtained which is described in the recapitulation which can be seen in Table 2.

Table 2. Recapitulation of Data on Disaster Literacy and Student Resilience in the Experimental and Control Groups

Description	Disaster Literacy		Resilience	
	Experiment	Control	Experiment	Control
Mean	90.14	84.61	89.99	80.02
Median	90	84	90	80
Standard Deviation	6.469	6.936	7.471	10.419
Minimum Value	79	67	70	60
Maximum Value	100	100	100	100
The number of students	74	88	74	88

Based on Table 2 The above shows that the disaster literacy data for experimental group students obtained an average score of 90.14, the median was 90, the standard deviation was 6.469, the minimum score was 79 and the maximum score for students was 100. Meanwhile, in the disaster literacy data for control group students, the average score was obtained. The average is 84.61, the median is 84, the standard deviation is 6.936, the minimum score is 67 and the maximum student score is 100.

Furthermore, data on the resilience of the experimental group students also obtained an average value of 89.99, the median was 90, the standard deviation was 7.471, the minimum value was 70 and the maximum value of the students was 100. Meanwhile, the disaster resilience data of the control group students obtained a value The average is 80.02, the median is 80, the standard deviation is 10.419, the minimum score is 60 and the maximum score for students is 100. An illustration of the average score for disaster literacy and resilience of students in the experimental group and the control group can be seen in Figure 1.

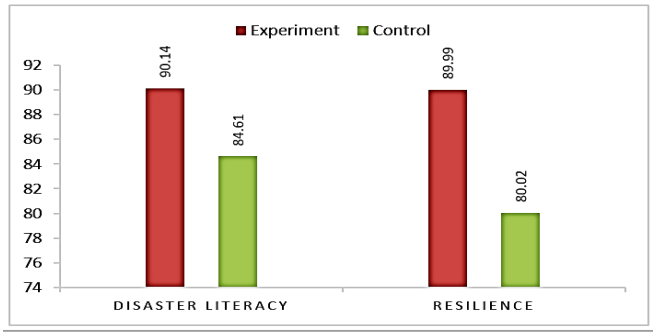

Figure 1. Comparison of Students' Disaster Literacy and Resilience Scores in The Experimental Group and The Control Group

Next, a normality test was carried out to measure the disaster literacy and resilience scores of students in both the control and experimental classes. Learning activities in the control class use a conventional model which is carried out with lectures, questions and answers, and assignments and the experimental class uses treatment in the form of a SETS-based disaster education model. The criteria for testing the normality test is to test whether the research population is normal or not with the statement Asymp.Sig > the alpha value set at α = 0.05, then the data in the population is normal, while the data with Asymp.Sig < the alpha value set α = 0.05, then it is considered abnormal. The normality test was carried out using Kolmogorov-Simirmov using the SPSS 24 for Windows program. The normality results using SPSS 24 for Windows are presented in Table 3.

Table 3. Normality Test Results

Variable	Class	Kolmogorov-Smirnov			Criteria	Decision
		Statistics	df	Sig.		
Disaster Literacy	Experiment	0.103	74	0.051	Sig > 0.05	Normally distributed
	Control	0.089	88	0.081		Normally distributed
Resilience	Experiment	0.100	74	0.062		Normally distributed
	Control	0.094	88	0.052		Normally distributed

The conclusion that can be drawn from Table 3 above is that the significance value is >0.05, so all the data above is declared normal distribution data. Next, the second prerequisite test carried out was the homogeneity test which was carried out using Levene's Test of Equality of Error Variance via the Box's M test. The results of the homogeneity test analysis were carried out using SPSS 24 for window to obtain the statistical value of the Levene test. The homogeneity test results can be seen in Table 4.

Table 4. Homogeneity Test Results

Box's Test of Equality of Covariance Matrices	
Box's M	8.978
F	2.952
df1	3
df2	164339993.000
Sig.	0.061

Based on Table 5 above, the significance value obtained is 0.061. The sig value is greater than α= 0.05 so it can be concluded that the covariance matrix between groups is assumed to be the same or homogeneous. Based on the prerequisite data analysis tests, it was found that the post-test data from the experimental and control groups were normal and homogeneous. After obtaining the results from the data analysis prerequisite tests, proceed with testing the research hypothesis. From the results of data processing in hypotheses 1 and 2, the F test of variants was carried out using Manova analysis using the Test of Between Subject Effects with the testing criteria for a significance level of F = 5%, if the calculated F significance number is less than 0.05 then the null hypothesis is rejected and Ha accepted. The test calculations are presented in Table 5.

Table 5. Variant F Test Results Using The Test of Between Subject Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Disaster Literacy	1225.500a	1	1225.500	27.085	0.000	0.145
	Resilience	3990.670b	1	3990.670	47.231	0.000	0.228
Intercept	Disaster Literacy	1227517.352	1	1227517.352	27129.283	0.000	0.994
	Resilience	1161834.571	1	1161834.571	13750.599	0.000	0.988
Class	Disaster Literacy	1225.500	1	1225.500	27.085	0.000	0.145
	Resilience	3990.670	1	3990.670	47.231	0.000	0.228
Error	Disaster Literacy	7239.512	160	45.247			
	Resilience	13518.941	160	84.493			
Total	Disaster Literacy	1238474.000	162				
	Resilience	1176259.000	162				
Corrected Total	Disaster Literacy	8465.012	161				
	Resilience	17509.611	161				

From the results of data processing seen in Table 5 which can be described as follows: First Hypothesis, the calculated F value is 151.781, df = 1, and sig = 0.000 < 0.05. This means significance < 0.05. Thus the null hypothesis (H_o) is rejected and the alternative hypothesis (H_a) is accepted. So based on the results of the first hypothesis analysis, there is a significant difference in disaster literacy between students taught using the SETS-based disaster education model and students taught using conventional learning. Looking at the research data, theoretically it can be said that the SETS-based disaster education model is better and more effective for increasing students' disaster literacy in the learning process.

Next, the Second Hypothesis, the research results show that the calculated F value is 75.391 df = 1, and sig = 0.000 < 0.05. This means significance < 0.05. Thus the null hypothesis (H_o) is rejected and the alternative hypothesis (H_a) is accepted. So based on the results of the first hypothesis analysis, there is a significant difference in resilience between students taught using the SETS-based disaster education model and students taught using conventional learning. Looking at the research data, theoretically it can be said that the SETS-based disaster education model is better and more effective for increasing student resilience.

Third Hypothesis, carried out with the F test through decisions taken using Pillae Trace, Wilk Lambda, Hotelling's Trace, Roy's Largest Root analysis, with a significance level testing criterion of F = 5%. If the calculated F significance number is less than 0.05 then the null hypothesis is rejected and Ha is accepted. The test calculations are presented in Table 6.

Table 6. Multivariate Test Results

Effect		Value	F	Hypothesis df	df error	Sig.	Partial Eta Squared
Class	Pillai's Trace	0.305	34.924b	2.000	159.000	0.000	0.305
	Wilks' Lambda	0.695	34.924b	2.000	159.000	0.000	0.305
	Hotelling's Trace	0.439	34.924b	2.000	159.000	0.000	0.305
	Roy's Largest Root	0.439	34.924b	2.000	159.000	0.000	0.305

Based on Table 6 above, the research results show that the calculated F value of Pillae Trace ($F_{calculated}$ =34.924), Wilk Lambda (F_{count} =34.924), Hotelling's Trace (F_{count} =34.924), Roy's Largest Root (F_{count} =34.924), all have a significance of 0.000 < 0.05, so the null hypothesis (H_o) is rejected and the alternative hypothesis (H_a) is accepted. Thus, based on the analysis of the third hypothesis, there is a significant difference in disaster literacy and resilience together between students taught using the SETS-based disaster education model and students taught using conventional learning. Looking at the research data, theoretically it can be said that the SETS-based disaster education model is better and more effective for increasing student disaster literacy and resilience.

Discussion

Based on the results from the research obtained, several results were obtained. The first, there was a significant difference in disaster literacy between experimental class students who were taught with the SETS vision disaster education model and control class students who were taught with conventional learning models. Looking at the research data, theoretically it can be said that the disaster education model with the SETS vision is measurably better and more effective in increasing students' disaster literacy compared to conventional learning models. The existence of disaster education can encourage the

creation of a generation that is resilient to disasters, because this education encourages students to be able to increase their own resilience and ability to face disaster risks (Hafida, 2018;Shah et al., 2018). Disaster education with the SETS vision refers to Law Number 24 of 2007 concerning Disaster Management which contains activities to prevent, reduce, avoid and recover from the impacts of disasters. So that the contents of the law can be understood by students, the law must be integrated into educational development programs so that it is able to give birth to a disaster-literate generation. This education also involves students in disaster resilience programs and can be a means of increasing disaster literacy so that students' understanding in analyzing solutions to disasters that frequently occur in Indonesia can increase (Afrian & Islami, 2019;Koem & Akase, 2022). To understand this disaster, students need disaster literacy because disaster literacy is a key word that students must understand to fully understand that the geographical location of Indonesia is in a disaster area. The results of research by other researchers show that disaster literacy can improve disaster response for society, because literacy provides basic knowledge, abilities and attitudes for disasters (Maryani et al., 2022). Teachers have a strategic role in preparing students from an early age to better understand natural disasters (Indrawati et al., 2019;Rusilowati et al., 2012). To achieve this, the learning process needs to be well planned and supported by valid, practical and effective learning tools,one of which is the disaster education model with the SETS vision (Nieveen, 1999;Fatmawati, 2016). This is in line with findings from other researchers which state that the disaster learning model integrated with Natural Sciences subjects with the SETS approach is suitable for increasing students' understanding and literacy of natural disasters (Rusilowati et al., 2012). In the SETS approach, students are trained to be able to think globally in solving problems according to the level of their thinking and reasoning abilities. In the end, students are expected to be able to apply the technological concepts and knowledge they have acquired in their daily lives.

The second, the implementation of the disaster education model with the SETS vision has had an influence in increasing student resilience.This is in line with the findings of other researchers who explain that learning about potential disasters will influence students' perceptions of disasters such as they will feel safe. Living in disaster-prone areas carries a very big risk because it can reduce people's awareness of the possibility of disasters that can occur at any time in the area. that region (Permana, 2021). In disaster studies, resilience does not only mean providing assistance to victims, but also their capacity and ability to face disasters (Puspitasari et al., 2019). Resilience is formulated as a positive adaptation pattern related to experience, attitude, skills, internal and external resources to overcome unpleasant conditions (adversity) (Fitri, 2014). This statement is supported by other researchers who found that student resilience is very important to improve and develop. Therefore, students need provision to improve their resilience abilities (Sasmita & Afriyenti, 2019). Teachers as educators who interact directly with students have a strategic role in instilling disaster mitigation and resilience skills through implementing the SETS vision disaster education model in schools. This is in line with the findings that the natural disaster learning model integrated in science with the SETS vision is suitable for understanding natural disaster material and can increase students' understanding of natural disasters (Indrawati et al., 2019). The SETS approach builds connections between students' beliefs and the real world (Wati, 2022).The learning environment created encourages students to collect data, solve their problems, consider alternative solutions in dealing with disasters and the best way to solve problems and put them into practice (Imaduddin & Hidayah, 2019).

The third, based on the research data, theoretically it can be said that the disaster education model with the SETS vision has an influence in simultaneously increasing student literacy and resilience.This is in line with the views of other researchers who state that the concept of natural disasters will be easier to understand if explained through learning (Prastyo et al., 2021). Natural disaster mitigation education is needed for students who live in disaster areas with the aim of providing initial disaster management (Nuriman et al., 2022). To be able to provide awareness of the importance of disaster literacy, one example can be provided through disaster education which is included in the material content in schools. It is hoped that disaster education can be introduced early to all school members so that they can contribute to preparedness both individually and in society (Maliki et al., 2023). Knowledge of understanding disasters in the environment around where you live is the first step in introducing disaster material so that students can know how to deal with disasters. Developing learning features such as effective learning models increases resilience, understanding and literacy related to disasters (Rusilowati et al., 2012). Disaster information is used as consideration in making policies or decisions by following instructions in the context of mitigation, preparedness, response and recovery from disasters (Prakoso et al., 2021;Marlyono et al., 2016). Disaster literacy is important because in disaster situations often spread hoax information that is detrimental and makes people panic. With disaster literacy, people can filter, check and reconsider the disaster information they receive so they can decide on appropriate and efficient actions. This is expected to form a tough character, preparedness and independence of students when a disaster occurs, as well as reduce disaster risks and minimize casualties

in the children's sector (Sunimbar et al., 2022). Disaster risk reduction activities as mandated by Law no. 24 of 2007 concerning Disaster Management must be integrated into development programs, including in the education sector. It is also emphasized in the law that education is one of the determining factors in disaster risk reduction activities.Because everyone must take a role in disaster risk reduction activities, schools and communities within them must also start introducing materials about disasters as part of daily educational activities. Efforts to increase awareness of community preparedness for disasters in the world of education must be carried out both at the level of policy makers and education implementers at the central and regional levels. With the hope that all levels have the same understanding of the need for disaster preparedness education.

Disaster learning activities in Article 1 paragraph 6 PP No. 21 of 2008 concerning the Implementation of Disaster Management is a series of efforts to reduce disaster risk, both through physical development and awareness and increasing capacity to face the threat of disaster (Rahmat et al., 2015). A suitable approach to studying disasters is the SETS (Science, Environment, Technology and Society) learning model, which in Indonesian is Science, Environment, Technology and Society (Fitransyah & Supardi, 2022).Disaster education in primary and secondary schools helps children play an important role in saving lives and protecting community members during disaster events. Organizing education about disaster risk into the school curriculum is very helpful in building awareness of this issue in the community. In addition to their important role in formal education, schools must also be able to protect children from natural disasters. Investing in strengthening school building structures before a disaster occurs will reduce long-term costs/budgets, protect the nation's future young generation, and ensure the continuity of teaching and learning activities after a disaster occurs.

SETS learning also helps students utilize the school environment to obtain information based on the material being studied, students utilize the environment around the school to observe objects around the school so that the SETS approach is a meaningful learning concept when they want to learn about natural disasters. Overall, this research has been carried out in accordance with experimental research procedures (Zahra et al., 2019;Mursalin & Setiaji, 2021). However, in its implementation, there are several limitations, including: 1) the SETS-based disaster learning model focuses on learning for one type of disaster, namely earthquakes, so further research needs to be carried out to test other types of disasters; 2) this SETS-based disaster learning model focuses on disaster literacy and resilience for elementary school students and 3) the schools used as subjects are limited to fifth grade elementary school students in disaster-prone areas, Bantul Regency, DIY.

4. CONCLUSION

Based on the results of the analysis that has been carried out, it shows that the SETS-based disaster learning model can have a positive impact on disaster literacy and resilience in fifth grade elementary school students. Thus, it can be concluded that the SETS-based disaster learning model can have a positive impact on disaster literacy and resilience in fifth grade elementary school students. SETS learning can also help students utilize the school environment to obtain information based on the material studied, thereby creating a meaningful learning experience for students.

5. ACKNOWLEDGE

Thank you to the Research Directorate Technology and Community Service (DRTPM) of the Ministry of Education and Culture, which has funded this research through the 2023 Postgraduate Research - Master's Thesis Research (PPs - PTM) scheme with DIPA SP DIPA Number-023.17.1.690523/2023 4th revision, March 31 2023. Contract Number Parent between DRTPM and LLDIKTI V 181/E5/PG.02.00.PL/2023. LLDIKTI Contract Number with LPPM UPY 0423.12/LL5-INT/AL.04/2023 dated 22 June 2023. Contract number between LPPM UPY and Researchers 0331/BAP-LPPM/VI/2023 dated 26 June 2023.

6. REFERENCES

Afrian, R., & Islami, Z. R. (2019). Peningkatan potensi mitigasi bencana dengan penguatan kemampuan literasi kebencanaan pada masyarakat Kota Langsa. *Jurnal Pendidikan Geografi*, *24*(2), 132–144. https://doi.org/10.17977/um017v24i22019p132.

Amaliya, S., Rusilowati, A., & Supriyadi. (2011). Penerapan Physics Communication Games Dengan Pendekatan Sets Untuk Meningkatkan Pemahaman Kebencanaan Dan Minat Belajar Sains Fisika Siswa SMP. *Jurnal Pendidikan Fisika Indonesia*, *7*(2), 101–105.

Atmojo, M. E. (2020). Pendidikan Dini Mitigasi Bencana. *Jurnal Abdimas BSI: Jurnal Pengabdian Kepada Masyarakat*, *3*(2), 118–126. https://doi.org/10.31294/jabdimas.v3i2.6475.

Börner, S. (2023). Emotions matter: EMPOWER-ing youth by integrating emotions of (chronic) disaster risk into strategies for disaster preparedness. *International Journal of Disaster Risk Reduction*, *89*. https://doi.org/10.1016/j.ijdrr.2023.103636.

Budiarti, R., Wilujeng, I., Jumadi, J., & Senam, S. (2016). Pengaruh Pembelajaran IPA Berbasis Sets Terhadap Pengetahuan Lintas Disiplin Peserta Didik. *Jurnal Cakrawala Pendidikan*, *3*(3). https://doi.org/10.21831/Cp.V35i3.10419.

Fatmawati, A. (2016). Pengembangan Perangkat Pembelajaran Konsep Pencemaran Lingkungan Menggunakan Model Pembelajaran Berdasarkan Masalah untuk SMA Kelas X. *EduSains*, *4*(2), 94–103.

Fitransyah, M. D., & Supardi, Z. A. I. (2022). Penerapan Pembelajaran SETS (Science, Environment, Technology and Society) untuk meningkatkan Pemahaman Kebencanaan Tsunami Peserta didik pada materi Gelombang Mekanik. *IPF: Inovasi Pendidikan Fisika*, *11*(2), 11–16. https://doi.org/10.26740/ipf.v11n2.p11-16.

Fitri, W. (2014). Nilai Budaya Lokal, Resiliensi, dan Kesiapan Menghadapi Bencana Alam. *Personifikasi*, *5*(2), 123–138.

Hadi, H., Agustina, S., & Subhani, A. (2019). Penguatan Kesiapsiagaan Stakeholder dalam Pengurangan Risiko Bencana Alam Gempabumi. *Geodika: Jurnal Kajian Ilmu dan Pendidikan Geografi*, *3*(1), 30–40. https://doi.org/10.29408/geodika.v3i1.1476.

Hafida, S. H. N. (2018). Urgensi Pendidikan Kebencanaan Bagi Siswa Sebagai Upaya Mewujudkan Generasi Tangguh Bencana. *Jurnal Pendidikan Ilmu Sosial*, *28*(2), 1–10.

Hayati, I. A., Rosana, D., & Sukardiyono, S. (2019). Pengembangan modul potensi lokal berbasis SETS untuk meningkatkan keterampilan proses IPA. *Jurnal Inovasi Pendidikan IPA*, *5*(2), 248–257. https://doi.org/10.21831/jipi.v5i2.27519.

Imaduddin, M., & Hidayah, F. F. (2019). Redesigning laboratories for pre-service chemistry teachers: From cookbook experiments to inquiry-based science, environment, technology, and society approach. *Journal of Turkish Science Education*, *16*(4), 489–507. https://doi.org/10.36681/tused.2020.3.

Indrawati, F. Y., Fatmaryanti, S. D., & Maftukhin, A. (2019). Pengaruh Pembelajaran Fisika Menggunakan Model SETS (Science, Environment, Technology, and Society) Terintegrasi Mitigasi Bencana Alam Terhadap Kemampuan Analisis dan Transferable Skills Peserta Didik. *Radiasi : Jurnal Berkala Pendidikan Fisika*, *12*(2), 54–60. https://doi.org/10.37729/radiasi.v12i2.52.

Irawan, I., Subiakto, Y., & Kustiawan, B. (2022). Manajemen Mitigasi Bencana Pada Pendidikan Anak Usia Dini untuk Mengurangi Risiko Bencana Gempa Bumi. *PENDIPA Journal of Science Education*, *6*(2), 609–615. https://doi.org/10.33369/pendipa.6.2.609-615.

Khusna, N. I., Sumarmi, Bachri, S., Astina, I. K., Susilo, S., & Idris. (2023). Social resilience and disaster resilience: A strategy in disaster management efforts based on big data analysis in Indonesian's twitter users. *Heliyon*, *9*. https://doi.org/10.1016/j.heliyon.2023.e19669.

Kimura, R., Hayashi, H., Kobayashi, K., Nishino, T., Urabe, K., & Inoue, S. (2017). Development of a "disaster management literacy hub" for collecting, creating, and transmitting disaster management content to increase disaster management literacy. *Journal of Disaster Research*, *12*(1), 42–56. https://doi.org/10.20965/jdr.2017.p0042.

Koem, S., & Akase, N. (2022). Konseptualisasi Untuk Komunitas: Menuju Kesukarelaan Dalam Aksi Adaptasi Dan Mitigasi Bencana. *LAMAHU: Jurnal Pengabdian Masyarakat Terintegrasi*, *1*(1), 16–23. https://doi.org/10.34312/lamahu.v1i1.13560.

Labudasari, E., & Rochmah, E. (2020). Literasi bencana di sekolah: Sebagai edukasi untuk meningkatkan pemahaman kebencanaan. *Metode Didaktik: Jurnal Pendidikan Ke-SD-an*, *16*(1), 41–48. https://doi.org/https://doi.org/10.17509/md.v16i1.22757.

Lestari, A. D., Sutarno, S., Rohadi, N., Sakti, I., & Nirwana, N. (2021). Pengembangan Modul Fisika Berbasis Science, Environment, Technology, and Society (Sets) Untuk Melatihkan Keterampilan Berpikir Kreatif Siswa Sma Pada Materi Usaha Dan Energi. *Jurnal Kumparan Fisika*, *4*(2), 147–154.

Lestari, W. D., Yuhanna, W. L., & Lukitasari, M. (2020). Pengembangan Media Bio Pop-Up Book Terintegrasi Science, Environment, Technology, And Society (SETS) Pada Pembelajaran Biologi Materi Daur Biogeokimia. *Jurnal Edukasi Matematika dan Sains*, *8*(2), 130–139. https://doi.org/10.25273/jems.v8i2.7442.

Maliki, R. Z., Arsy, R. F., Rahmawati, R., & Muis, A. A. (2023). Pendampingan Pemetaan Partisipatif Sekolah Siaga Bencana. *Surya Abdimas*, *7*(1), 1–7. https://doi.org/10.37729/abdimas.v7i1.2322.

Marlyono, S. G., Pasya, G. K., & Nandi. (2016). Peranan Literasi Informasi Bencana Terhadap Kesiapsiagaan Bencana Masyarakat Jawa Barat. *Gea. Jurnal Pendidikan Geografi*, *16*(2), 116–123.

https://doi.org/https://doi.org/10.17509/gea.v16i2.4491.
Maryani, E., Ruhimat, M., & Logayah, D. S. (2022). Bencana Pada Guru Mgmp. *GERVASI: Jurnal Pengabdian kepada Masyarakat*, *6*(3), 948–959.
Mursalin, E., & Setiaji, A. B. (2021). Menumbuhkan Kepedulian Lingkungan melalui Literasi Sains : Penggunaan Pendekatan dan Model Pembelajaran yang Efektif. *Proceeding Seminar Pendidikan Nasional Jurusan Tarbiyah FTIK IAIN Palangka Raya*, 95–104.
Nazaruddin, M. (2015). Jurnalisme Bencana di Indonesia, Setelah Sepululi Tahun. *Jurnal Komunikasi*, *10*(1), 79–88. https://doi.org/https://doi.org/10.20885/komunikasi.vol10.iss1.art8.
Nieveen, N. (1999). *Prototyping to Reach Product Quality. Jan Van den Akker, Robert Maribe Braneh, Kent Gustafson, and Tjeerd Plomp (Ed)*. London: Kluwer Academic Publisher.
Novak, J., Lozos, J. C., & Spear, S. E. (2019). Development of an Interactive Escape Room Intervention to Educate College Students about Earthquake Preparedness. *Natural Hazards Review*, *20*(1), 1–5. https://doi.org/10.1061/(asce)nh.1527-6996.0000322.
Nuriman, N., Agustiningsih, A., Mahmudi, K., Aguk, A., Wardani, R. P., & Alfian, Z. (2022). Edukasi Pendidikan Mitigasi Erupsi Gunung Semeru pada Siswa Sekolah Dasar. *Jurnal Basicedu*, *6*(6), 9958–9966. https://doi.org/10.31004/basicedu.v6i6.4180.
Permana, I. Y. (2021). Pendidikan Keaksaraan Dasar Literasi Mitigasi Bencana. *Jurnal AKRAB*, *12*(1), 18–27. https://doi.org/10.51495/jurnalakrab.v12i1.372.
Prakoso, B., Widana, I. D. K. K., & Subiyanto, A. (2021). Pendidikan dan Literasi Bencana dalam Kerangka Tri Sentra Pendidikan untuk Generasi Tangguh Bencana. *Jurnal Manajemen Bencana*, *7*(1), 59–76. https://doi.org/10.33172/jmb.v7i1.705.
Prastyo, E., Kartika, I., & Wibowo, W. S. (2021). Kualitas subject specific pedagogy (SSP) IPA berbasis model iqra' dan literasi mitigasi bencana merapi. *Edu Sains: Jurnal Pendidikan Sains & Matematika*, *9*(2), 130–137. https://doi.org/10.23971/eds.v9i2.2244.
Puspitasari, D. C., Aini, M. N., & Satriani, R. (2019). Penguatan Resiliensi dan Strategi Penghidupan Masyarakat Rawan Bencana. *Talenta Conference Series: Local Wisdom, Social, and Arts (LWSA)*, *2*, 32–40. https://doi.org/10.32734/lwsa.v2i1.592.
Ragil, Z., & Sukiswo, S. E. (2011). Penerapan Pembelajaran Sains dengan Pendekatan Sets pada Materi Cahaya untuk Meningkatkan Hasil Belajar Siswa Kelas V SD. *Jurnal Pendidikan Fisika Indonesia*, *7*(1), 69–73. https://doi.org/10.15294/jpfi.v7i1.1073.
Rahmat, H. K., Sari, F. P., Hasanah, M., Pratiwi, S., Ikhsan, A. M., Rahmanisa, R., Pernanda, S., & Fadil, A. M. (2020). Upaya Pengurangan Risiko Bencana Melalui Pelibatan Penyandang Disabilitas Di Indonesia: Sebuah Tinjauan Kepustakaan Disaster Risk Reduction Efforts Through Involvement of People With Disabilities in Indonesia: a Literature Review. *Jurnal Manajemen Bencana (JMB)*, *6*(2), 55–64. https://doi.org/10.33172/jmb.v6i2.623.
Rahmat, Nizzamudin, & Agussabati. (2015). Kajian Distribusi Pengelolaan Anggaran Pendapatan Belanja Aceh Terhadap Program Kebencanaan. *Jurnal Ilmu Kebencanaan (JIKA)*, *2*(3), 24–32.
Ronan, K. R., Alisic, E., Towers, B., Johnson, V. A., & Johnston, D. M. (2015). Disaster Preparedness for Children and Families: a Critical Review. *Current Psychiatry Reports*, *17*(7), 1–9. https://doi.org/10.1007/s11920-015-0589-6.
Rusilowati, A., Supriyadi, Binadja, A., & Mulyani, S. (2012). Mitigasi Bencana Alam Berbasis Pembelajaran Bervisi Science Environment Technology and Society. *Jurnal Pendidikan Fisika Indonesia*, *8*(1), 51–60.
Sampurno, P. J., Sari, Y. A., & Wijaya, A. D. (2015). Integrating STEM (Science, Technology, Engineering, Mathematics) and Disaster (STEM-D) Education for Building Students' Disaster Literacy. *International Journal of Learning*, *1*(1), 73–76. https://doi.org/10.18178/IJLT.1.1.73-76.
Sasmita, N. O., & Afriyenti, L. U. (2019). Resiliensi Pascabencana Tsunami. *INSAN Jurnal Psikologi dan Kesehatan Mental*, *4*(2), 94–101. https://doi.org/10.20473/jpkm.v4i22019.94-101.
Shah, A. A., Ye, J., Abid, M., Khan, J., & Amir, S. M. (2018). Flood hazards: household vulnerability and resilience in disaster-prone districts of Khyber Pakhtunkhwa province, Pakistan. *Natural Hazards*, *93*(1), 147–165. https://doi.org/10.1007/s11069-018-3293-0.
Sunimbar, Wulakada, H. H., Samin, M., Mari, N. A. H. N., & Sukmawati. (2022). Meningkatkan Kesiapsiagaan Warga Sekolah Dasar. *Journal of Character Education Society*, *5*(4), 171–180. https://doi.org/https://doi.org/10.31764/jces.v5i4.10308.
Wati, W. W., Asrizal, A., & Usmeldi, U. (2022). Analisis Effect Size Pengaruh Pembelajaran IPA Berbasis SETS Terhadap Kemampuan Proses Sains dan Hasil Belajar. *Jurnal IPA & Pembelajaran IPA*, *6*(1), 54–69. https://doi.org/10.24815/jipi.v6i1.23894.
Widiyanto, B. (2022). Pengembangan Modul Pengelolaan Laboratorium IPA Bab Keselamatan Dan Keamanan Kerja Untuk Meningkatkan Keterampilan Proses Sains Calon Guru IPA. *PSEJ*

(Pancasakti Science Education Journal), *7*(2), 118–128. https://doi.org/10.24905/psej.v7i2.166.

Yulianto, S., Apriyadi, R. K., Aprilyanto, A., Winugroho, T., Ponangsera, I. S., & Wilopo, W. (2021). Histori Bencana dan Penanggulangannya di Indonesia Ditinjau Dari Perspektif Keamanan Nasional. *PENDIPA Journal of Science Education*, *5*(2), 180–187. https://doi.org/10.33369/pendipa.5.2.180-187.

Zahra, M., Wati, W., & Makbuloh, D. (2019). Pembelajaran SETS (Science, Environment, Technology, Society): The Effect on Science Process Skills. *Indonesian Journal of Science and Mathematics Education*, *02*(3), 320–327.