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Article

The Impact of Comics Education on 4th Grade Students' Knowledge of Earthquake Safety at Al-Azhar 16 Cilacap

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ABSTRACT

Indonesia is an archipelagic country situated on the Ring of Fire, which frequently experiences earthquakes. Cilacap Regency is ranked 456th nationally with a medium-risk classification in the Earthquake Disaster Risk Index for the year 2021. The impact of earthquakes depends on their type and magnitude, including on schools, with 52,902 schools located in earthquake-prone areas. During the 2018 NTB Earthquake, 1,235 schools experienced damage. Earthquakes can also occur while children are studying at school. Elementary schools are one of the foundations of the children's community. The group of elementary school children is a vulnerable group that needs protection and, at the same time, needs to enhance their knowledge of earthquake disaster mitigation. One enjoyable medium to educate elementary school children about earthquake disaster mitigation is through comics. To determine the influence of Education with Comic Media on the Knowledge of Earthquake Disaster Mitigation for 4th- grade students at SD Islam Al-Azhar 16 Cilacap, research was conducted using a qualitative research method with a pre- experimental design using the One Group Pretest-Posttest design. The sampling technique used in this study was total sampling, so all 78 members of the population were included as samples. Statistical analysis using the Wilcoxon signed-rank test showed a Z-value of -6.941 and a significance value (p-value) of 0.000, at $\alpha = 0.05$. This means that there is a significant difference in the average knowledge between before and after providing Education with Comic Media for Earthquake Disaster Mitigation.

INTRODUCTION

Indonesia is an archipelago located on the Ring of Fire that often causes earthquakes. Geologically, Indonesia is located at the confluence of four tectonic plates, namely the Indo-Australian Plate, Eurasian Plate, Pacific Plate and Philippine Sea Plate. The active movement of these four plates can be a source of earthquakes and tsunamis in Indonesia. There are 10 subduction earthquake sources around the island of Java. The Java Megathrust Zone 2 is located south of Cilacap Regency[1].

Cilacap Regency is ranked 456th nationally with a moderate risk class in the 2021 Earthquake Disaster Risk Index, while for the Tsunami disaster, it is ranked 208th nationally with a moderate risk class. Cilacap Regency is geologically close to the plate collision zone (Indo-Australian Plate and Eurasian Plate) in the south. To the north of Cilacap is an active fault, the Ajibarang fault. The plate collision zone and the Ajibarang Fault that flank Cilacap Regency make this area vulnerable and prone to earthquake disasters[2–4].

The impact caused by an earthquake depends on the type and magnitude of the earthquake itself. If infrastructure such as houses, electricity poles, trees, and so on cannot withstand the vibrations, they will collapse, fall, and falter. Schools are no exception, with 52,902 schools located in earthquake-prone areas. In the 2018 NTB earthquake, 1,235 schools were damaged. The largest number of 2,900 schools were damaged during the 2006 Jogja Earthquake. In a study conducted after the 2009 Padang earthquake on 17 junior high schools, it was revealed that heavy damage dominated especially in classrooms[5–7].

Earthquakes can hit anyone, anywhere, in any group, and during any activity. Earthquakes can also occur when children are learning at school. Elementary schools are one of the bases of the children's community. Elementary school children are a vulnerable group that must be protected, and at the same time their knowledge of earthquake disaster mitigation needs to be improved. In order for elementary school children to be able to make appropriate risk prevention efforts in the event of an earthquake disaster, learning earthquake disaster mitigation for elementary school children is very strategic to implement. This is done with the consideration that knowledge of natural disaster mitigation that is taught from an early age will improve children's ability to be vigilant before natural disasters, to save themselves appropriately when natural disasters occur, and to know the activities that can and cannot be carried out after an earthquake[8].

Increasing elementary school children's knowledge of earthquake disaster mitigation will be effective if supported by appropriate methods of delivering material and media. Conventional methods such as lectures using textbooks are considered less effective for learning materials that

involve a stage of activity that requires students' imagination[9]. In education, educational methods and media function as a means to achieve learning objectives. There are many methods and media that are often and commonly used in delivering disaster mitigation material to elementary school children, namely lectures/exposures, posters, leaflets, comics, etc. The information contained in the media should be able to involve students in the learning process. The information contained in the media should be able to involve students, both in the mind or mentally and in the form of real activities, so that learning can occur. One of the fun media to use for elementary school children is comics. The image-filled and interactive nature of comics helps elementary school children to quickly grasp the meaning of the comic content and be interested in knowing the content on the next page[10].

SD Islam Al-Azhar 16 is one of the best private Islamic schools in Cilacap Regency, owned by Ibnu Sina Education Foundation (YAPIS) Cilacap which was established in 1997, with Operational License Decree Number: 004/103.01.02/DS/1997, dated January 4, 1997. As one of the leading schools in Cilacap Regency, SD Islam Al-Azhar 16 not only strives to maintain the quality of its learning process, but also organizes many other activities, including social activities that support the formation of superior character of its students. The school is located on Jl. Galunggung no. 8, Sidanegara, Central Cilacap, which is a high risk area for earthquakes due to its soft soil[11].

Based on the results of preliminary studies conducted by researchers on December 28, 2022, it is known that currently there are 514 students at SD Islam Al-Azhar 16 Cilacap, consisting of: 200 students, and 254 female students. Each class numbers between 70 - 100 students, which are divided into 3 - 4 parallel classes. The results of interviews with the principal and several class teachers related to earthquake disaster mitigation, obtained information that in the past before the Covid-19 pandemic, it was always carried out routinely once a year, even up to roleplay, in collaboration with the Cilacap Regional Agency for Disaster Management. However, in the last three years it has not been implemented anymore. This study aims to assess the effectiveness of education by comics on the knowledge of earthquake mitigation on 4th grade students in AL-Azhar Islamic Elementary School in Cilacap.

METHODS

This research is quantitative. The design in this study is pre-experimental with a one-group pretest-posttest design conducted to determine the difference in knowledge before and after the intervention. The sampling population uses a sampling technique, namely total sampling so that all students who are in Class IV of Al-Azhar 16 Cilacap Islamic Elementary School in the 2023/2024 school year period, totaling 78 students, will be sampled because according to Piaget in Sugiyanto, (2015).

Elementary school children are in two stages of cognitive development, namely: a).

Concrete Operational (7-11 years old), children have understood logical operations with the help of concrete objects, this is because the use of logic is adequate, and b). Formal Operational (12-15 years old), where they have begun to be able to think abstractly, reason logically and conclude from the available information[12].

In this study, the variables to be studied are earthquake disaster mitigation education with comic media as an independent variable and student knowledge about earthquake management as a dependent variable. The research instrument used is a questionnaire which contains informed consent, respondent identity, respondent characteristics and questions about earthquake disaster management. The validity test at SD IT Insan Mulia on July 18, 2023 with 61 respondents using a knowledge questionnaire of 20 questions. After students filled out the questionnaire, the researcher processed the data in excel and entered it into SPSS. After the data was entered into SPSS, the researcher analyzed the validity test using product moment per item of each question. Of the 20 question items on earthquake disaster mitigation knowledge, 16 were declared valid by showing the results that R count was greater than R table (0.254) with a minimum value of 0.279 and a maximum value of 0.529. Invalid question items totaled 4 and were immediately removed from the questionnaire. Reliability test using Spearman-Brown the result of reliability is 0.453. The earthquake disaster management questionnaire was compiled by the researchers themselves and validated by experts. Then another instrument is educational media in the form of comics by Ms. Dholina Inang Pambudi, M.Pd with the title "Earthquake Mitigation Education".

RESULTS

Based on Table 1, it can be seen that the characteristics of respondents based on age are divided into two groups, namely 9 years old and 10 years old, with almost the same frequency and percentage distribution, namely 43 students (55.1%) aged 9 years, and 35 students (44.9%), aged 10 years. Similarly, from the characteristics of gender, the number of male and female respondents had almost the same frequency distribution and percentage, namely 38 male students (48.7%), and 40 female students (51.3%).

Table 1. Respondent Characteristics

Characteristics		***f (frequency)***	***% (percentage)***
Age	9 years	43	55,1
	10 years	35	44,9
	Total	78	100
Gender	Male	38	48,7
	Female	40	51,3
	Total	78	100

Table 2. Respondents' Knowledge Before Being Educated on Earthquake Disaster Mitigation Comics

Variables	N	Min-Max	Mean	SD
Knowledge Pretest	78	13-88	53,53	15,186

Table 2 showed that out of 78 respondents, the mean knowledge before the intervention of earthquake disaster mitigation comic education was 53.53 (minimum value 13 and maximum 88), with a standard deviation of 15.186.

Table 3. Distribution per Respondent's Answer Item Before Being Provided with Earthquake Disaster Mitigation Comic Education

Item No.	Correct		Wrong	
	frequency	% (percentage)	Frequency	% (percentage)
1	15	19,2	63	80,8
2	49	62,8	29	37,2
3	27	34,6	51	65,4
4	25	32,1	53	67,9
5	25	32,1	53	67,9
6	30	38,5	48	61,5
7	17	21,8	17	78,2
8	26	33,3	26	66,7
9	36	46,2	42	53,8
10	74	94,9	4	5,1
11	62	79,5	16	20,5
12	71	91	7	9
13	71	91	7	9
14	41	52,6	37	47,4
15	50	64,1	28	35,9
16	48	61,5	30	38,5

Table 3 showed that out of 16 question items, most respondents answered correctly the questions about what to do during an earthquake, namely question numbers 10-13. Most respondents answered incorrectly on questions about earthquake concepts that should be practiced before an earthquake, namely on items number 1 and 3-9. The average score obtained by respondents was 53.33, indicating the low knowledge of respondents regarding Earthquake Disaster Mitigation before being given education with comics.

Table 4. Respondents' Knowledge After Receiving Education on Earthquake Disaster Mitigation Comics

Variables	N	Min-Max	Mean	SD
Knowledge Posttest	78	13-100	72,27	18,412

Based on table 4, the average knowledge after being given the educational intervention of earthquake disaster mitigation comics was 72.27 (minimum value 13 and maximum 100), with a standard deviation of 18.412. The standard deviation is still quite far, It was caused by some children who had difficulty focusing during the provision of education.

Table 5. Distribution Per Item of Respondents' Answers After Being Provided with Earthquake Disaster Mitigation Comic Education

Item No.	Correct		Wrong	
	frequency	% (percentage)	frequency	% (percentage)
1	40	51,3	38	48,7
2	70	89,7	8	10,3
3	52	66,7	26	33,3
4	50	64,1	28	35,9
5	38	48,7	40	51,3
6	55	70,5	23	29,5
7	31	39,7	47	60,3
8	37	47,4	41	52,6
9	52	66,7	26	33,3
10	75	96,2	3	3,8
11	72	92,3	6	7,7
12	70	89,7	8	10,3
13	73	93,6	5	6,4
14	62	79,5	16	20,5
15	62	79,5	16	20,5
16	61	78,2	17	21,8

Table 5 showed that out of 16 question items, most respondents answered correctly the questions about what to do during an earthquake, namely question numbers 11-16. Most respondents answered incorrectly to questions about the concept of an earthquake and what to do before an earthquake occurs, namely items number 1, 5, 7, 8.

The average score obtained by respondents was 72.27, indicating the high knowledge of respondents regarding Earthquake Disaster Mitigation after education with comics, and even found respondents who obtained the maximum score of 100. The conceptual understanding of the occurrence of an event, in this case an earthquake, turned out to be difficult for children to understand.

Table 6. Differences in Earthquake Disaster Mitigation Knowledge of Grade IV Students of SDI Al-Azhar 16 Cilacap between Before and After Being Educated on Earthquake Disaster Mitigation Comics

Variables	N	Min-Max	Mean	SD	P
Knowledge Pretest	78	13-88	53,53	15,186	0,00
Knowledge Posttest	78	13-100	72,27	18,412	

Table 6 showed that the average knowledge of respondents before being given education on earthquake disaster mitigation comics was 53.53 and after being given comic education increased to 72.27. The Wilcoxon signed rank test results obtained a Z value of -6.941 and a significance value or p-value of 0.000, at $\alpha = 0.05$. Based on the p-value of 0.000, it can be concluded that Ho is rejected, because the p value is obtained <0.005, which means that there is a significant difference in the average knowledge between before and after being given the Earthquake Disaster Mitigation Comic Education.

Furthermore, when viewed from the increase in the average post test score compared to

the pretest score, which increased by 18.74, it also proves that there is a significant difference in respondents' knowledge between before and after being given the Earthquake Disaster Mitigation Comic Education. The existence of this difference can be stated as the Effect of Education with Comic Media on Earthquake Disaster Mitigation Knowledge of Class IV Students of Al-Azhar Islamic Elementary School.

DISCUSSION

Knowledge is strongly influenced by several factors including age, gender, experience and occupation. In this case, it is difficult for children to have knowledge in earthquake disaster mitigation at their age. Children have not experienced many things so it is difficult to gain knowledge through past experiences. Interest and knowledge are quite related, individuals who have an interest in a particular field tend to have more knowledge in that field[13,14].

The lack of information on mitigation is due to several factors such as the absence of disaster material in the current curriculum and respondents' low interest in reading[15]. Correct information related to earthquake disaster mitigation will answer respondents' curiosity from the information obtained. Lack of information can lead to ignorance of what to do in the event of a disaster.

Information is one of the sources of knowledge. Providing information will increase knowledge, in this case one of them is knowledge of earthquake disaster mitigation. Efforts to reduce the impact of disasters (mitigation) can be done one of them with education[16,17]. The high average value of knowledge after the intervention in this study is in line with the results of research by Wardha (2019) which states that there is an increase in the average posttest knowledge score, the average pretest score of 9.25 increases to 11.58[18]. This is in line with research conducted by Nugraheni (2019) which states that the average score of respondents before being given intervention with comic media is fairly low[19].

Aulia *et al.* (2021) stated that comics can add to the vocabulary of its readers, help in emotional development, attract attention, facilitate learning, foster interest in reading and stimulate imagination. Comics can also be an alternative learning media in earthquake disaster mitigation efforts that cannot be prevented, but casualties can be minimized[20].

Increased knowledge is one of the indicators of mitigation. Risks can be minimized by increasing knowledge about earthquake disaster mitigation. Respondents' interest in disaster mitigation can be triggered as a result of providing education with comic media. Increased knowledge of earthquake disaster mitigation is a disaster mitigation that must be sustainable whether it is in the curriculum or not[21–23].

The significant increase in child respondents is to Piaget's theory in Putri *et al.*, (2020)

which is the stage of the concrete operational phase. The concrete operational phase is when children already understand logical operations with surrounding objects[16,24].

The results of this study are in line with the research Maharani et al. (2021) that there is a significant difference in knowledge before and after comic education is given because the information conveyed has a positive impact on children. A significant effect of using comic media that is coherent, more interesting, and clear can invite readers to imagine, and it is easier to concentrate in class. A significant increase in knowledge is needed for children because currently, children lack information in the field of disaster mitigation[15,22,25].

This research is reinforced by Anies (2019), with results where it has been proven that there is a significant difference using comic media. It was also reinforced by research conducted by Noviana et al. (2019) that there was a significant increase in knowledge with the use of comic media. Comics that are colorful, little writing, and full of pictures make children happy to learn[15,26]. A significant increase in knowledge after being given comic education can make it easier for students to understand the material because comic media is attractive. In addition, the message conveyed by the writing is short and clear so that students can quickly understand the contents of the comic. This indicates that the use of comic media in learning can make it easier to receive new knowledge. The existence of a sustainable program regarding earthquake disaster mitigation education will create a generation that is resilient and ready to face disasters[27].

CONCLUSION

Based on the results of the research, it can be concluded that the mean knowledge of fourth-grade students of SD Islam Al-Azhar 16 Cilacap before being given the intervention of Educational Comic on Earthquake Disaster Mitigation was 53.53 and it was increased after the intervention by Educational Comic on Earthquake Disaster Mitigation become 72.27. There is a significant difference in the mean knowledge before and after being given the Earthquake Disaster Mitigation Comic Education (Z=-6.941, p value = 0.000, α = 0.005).

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