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Development of Picture Story Book Learning Media as Literacy Material for Earthquake Disaster Mitigation Students of Tegal Ratu Cilegon State Elementary School Banten

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ABSTRACT

This research on the development of picture storybook media aims to provide education as literacy material for elementary school students regarding earthquake disaster mitigation, especially in the Cilegon area, Banten, which is one of the earthquake-prone areas. This research aims to develop a picture storybook media entitled "I'm Not Afraid of the Earthquake!" and find out the feasibility of the picture storybook. The process of developing picture storybooks uses the Hannafin and Peck method with three processes, namely needs analysis, design, and development with each process going through an evaluation and revision process. Data collection was carried out using questionnaires. The type of data produced is in the form of quantitative data that is analyzed using assessment criteria guidelines to determine product quality. The validation results from experts stated that the product with an average percentage of 95% with a very decent category. The assessment of media experts obtained a score of 93% and the assessment of material experts obtained a score of 98% and the trial of student products obtained a score of 90% with the category. This development research can be concluded that picture storybook media is very feasible to use for elementary school students.

KEYWORDS *Learning Media, Picture Storybook, Disaster Mitigation, Earthquake*

INTRODUCTION

Indonesia is an archipelagic country with a strategic position between three actively moving continental plates, and is traversed by two active circles of the world's volcanoes: the *Circumference of the Mediterranean Mountains* and the *Circumference of the Pacific Mountains*. As a result, Indonesia is a region prone to various natural disasters, such as earthquakes, tsunamis, volcanic eruptions, and others (Izzati, Aulia. 2022). *Banten Province* is the youngest province formed from the expansion of *West*

Java province and is also an area susceptible to natural disasters. Natural disasters that frequently occur in *Banten Province* include floods, landslides, abrasion, tsunamis, and earthquakes. These disasters require disaster mitigation measures to reduce casualties and losses. Inadequate disaster management policies tend to have a detrimental effect on event and disaster management preparedness (Nick, 1991).

According to Dinisari (2022), there have been four major earthquakes in the Banten area over the last five years, including: the Banten earthquake with a magnitude of 6.1 on January 23, 2018, at 13:34 WIB in the Indian Ocean south of Java Island. The epicenter of the earthquake was 43km from *Muara Binuangeun* City, *Wanasalam District*, *Lebak Regency*, *Banten*, at a depth of 10km. An earthquake with a magnitude of 5.2, later updated to M4.9, occurred in *Bayah*, Banten, on July 28, 2019, due to the activity of the *Indo-Australian Plate* subducting under the *Eurasian Plate*, as explained by the *Meteorology, Climatology and Geophysics Agency (BMKG)* on Sunday (28/7). The results of the source mechanism analysis revealed that this earthquake was caused by rock deformation with a thrust-oblique movement mechanism. The 2019 Banten earthquake, with a magnitude of 6.9, struck Indonesia on August 2, 2019, at 19:05 WIB in the Indian Ocean. The epicenter was 164km from *Sumur*, *Pandeglang Regency*, *Banten*, at a depth of 48km. A 6.7 magnitude earthquake occurred in Banten on Friday afternoon, January 14, 2022, and was felt as far as Jakarta. According to BMKG, the earthquake was at a depth of 10km and occurred at 16:05 WIB. The earthquake's coordinate was at 7.01°S and 105.26°E, with the epicenter being 52km southwest of Banten (Gunawan et al., 2022; Pradono et al., 2024; Supendi et al., 2023).

Elementary School (SD) is a form of *Early Childhood Education (PAUD)* unit. The aim of elementary school as a continuation unit of early childhood education is closely aligned with the goals of basic education. One of these goals is to provide basic knowledge and skills useful for students, such as reading, writing, arithmetic, and preparing students for secondary education (Tedjawati et al., 2017). Understanding disaster knowledge must be instilled at a young age (Desfandi, 2014). This includes disaster mitigation—actions taken to reduce risk before, during, and after a disaster (Noviana et al., 2020). The aim of providing disaster mitigation understanding is to enable children to contribute to building the knowledge, skills, and attitudes needed by themselves and the community to return to normal life after a disaster (Selby & Kagawa, 2012). Providing disaster mitigation materials for children can take place in *intracurricular* (learning) activities (Desfandi, 2014) or direct simulation activities outside of school hours (Sari et al., 2019). Disaster mitigation content can also be integrated into the school curriculum (Winarni & Purwandari, 2018). Such content may be delivered with the help of learning media.

Cilegon is a city in *Banten Province* located in the western part of Java Island. Cilegon City covers an administrative area of 175.51km². The geographical and physical location of Cilegon attracts various parties to invest and has made Cilegon the largest industrial and service center on Java. Cilegon is an industrial city, with the most prominent industry being the petrochemical industry. However, the presence of *Anak*

Gunung Krakatau, which is still active, makes Cilegon highly prone to disasters. Through appropriate learning media, students can experience real-life learning. The disaster mitigation educational information that teachers wish to convey can also be more smoothly received by students. According to Arsyad (2011), the learning process has two essential elements: teaching methods and learning media. The selection of learning content for elementary students significantly affects learning effectiveness, as does the choice of types and reading materials. In terms of learning development, elementary students are still at the concrete operational development stage (7–11 years), making it easier for them to understand what they learn when it is illustrated through objects they encounter in everyday life (Leny, 2020).

Based on observations and interviews with the principal, *Muhayaroh, S.Pd*, and two school operators, *Shohifatul Jannah S.Pd.I* and *Aqsol Ghoyah S.Pd*, on Saturday, July 27, 2024, at *SD Negeri Tegal Ratu*, *Ciwandan District*, *Cilegon City*, *Banten*, it was found that Ciwandan is one area of Cilegon affected by earthquakes. According to Shohifatul Jannah S.Pd, disaster mitigation efforts have been carried out several times, but not routinely—either by the school or external parties, such as the education office and local government.

This research aims to design a new learning media in the form of picture storybooks that meet the eligibility criteria for both media and content about disaster mitigation, determined through validity and practicality tests. Based on the background and issues described above, the researcher will conduct a study entitled *Development of Picture Story Book Learning Media as Literacy Material for Earthquake Disaster Mitigation for Students of Tegal Ratu Cilegon State Elementary School Banten*.

METHOD

This research is development research, or better known as the *research and development* method. According to Sugiyono (2017), *research and development* research is research that aims to *produce* certain products and to test the effectiveness of these products. The development model used is the development model of *Hannafin and Peck*. The *Hannafin and Peck* development model is product-oriented. The development steps in the *Hannafin and Peck* model are as follows: 1) needs analysis, 2) design, and 3) develop and implement. Each stage goes through evaluation and revision stages.

The preliminary study was conducted at *SD Negeri Tegal Ratu*, which is located at Jl. KH. Hasyim, Tegal Ratu, *Ciwandan District*, *Cilegon City*, *Banten Province* 42445. The preliminary study was conducted on July 27, 2024. The material validity test was carried out on Friday, December 6, 2024, by *Ferryl Ilyasa, M.Pd* as an environmental practitioner. On the same day, the first media validation test was also conducted by *Dr. Mita Septiani, M.Pd* as a lecturer in the UNJ *Educational Technology Study Program*. The second media validity test was carried out on January 14, 2025, after improvements were made to the picture storybook media according to the directions and suggestions from the validator. Then, the research will continue with an effectiveness test assessed by students of *SD Negeri Tegal Ratu* on January 25, 2025. Based on the preliminary studies

that have been carried out, *Cilegon* and *Ciwandan* sub-districts are included in earthquake-prone areas due to their location intersecting with the *Sunda Strait*, which is a *tsunamigenic* area. The results of observations and needs analysis also found that 74% of respondents had experienced an earthquake directly.

After conducting validity and practicality tests, an effectiveness test will be carried out to assess how effective the development of the picture storybook media is in earthquake disaster mitigation. In the effectiveness testing process, a pre-test will be conducted before the intervention with students, and then followed by a post-test. The practicality and effectiveness testing will be limited to one fourth-grade study group only, with a total of 31 (thirty-one) students of *SD Negeri Tegal Ratu*.

Expert evaluations involving media experts and material experts were also carried out to assess the feasibility of the developed picture storybooks. The developer compiled a grid for the evaluation instrument for material experts and users (media). This grid is first validated by the validator. The grid of instruments to be validated is as follows:

Table 1. The grid of instruments to be validated

Yes	Aspects	Indicator
1	Quality of Material	Completeness of materials on earthquakes and disaster mitigation
		Breadth of material on earthquakes and disaster mitigation
		In-depth material on earthquakes and disaster mitigation
		Accuracy of concepts and definitions regarding earthquakes and disaster mitigation
		The material on earthquakes and disaster mitigation was made interesting
2	Compatibility with Students	The material in storybooks is easy to master and apply in daily life
		There are examples that can help students reinforce the material
3	Language Clarity	The language used is easy to understand
		The sentences used are effective in conveying the message
		The spelling and punctuation on the books are correct and in accordance with the linguistic rules
		Criterion
		Design of character images and backgrounds in storybooks
		Color combinations look harmonious
		Layout of images, text, and page numbering based on a fixed pattern
		The quality of the images and text of the story is clear
		The images on the book are varied and attention-grabbing
		Storybooks according to the age of elementary school students
		Storybooks contain the main character values according to the needs and characteristics of the students
		The language used is easy to understand
		The sentences used are effective in conveying the message
		The spelling and punctuation on the book are correct according to the linguistic rules

RESULTS AND DISCUSSION

Stages of product development analysis with the Hannafin and Peck model

1. Phase One Stage (Needs Analysis)

The initial stage carried out in the needs analysis is to conduct interviews with teachers of SD Negeri Tegal Ratu to find out the characteristics of students in general and

what kind of media are needed by SD negeri Tegal Ratu students. The author has conducted an interview as an initial observation stage to find out the teaching and learning conditions that are familiar with earthquakes. Various disaster mitigation efforts have been carried out by internal and external parties. The researcher also conducted data collection to analyze the needs of SD Negeri Tegal Ratu students for reading interest and knowledge about disaster and earthquake mitigation. The results of the needs analysis can be seen in the following table:

Table 2. The results of the needs analysis

No	Question Description	Answer Percentage	
		Ya	No
1	I can read	100%	0%
2	I can read a storybook and retell the contents	79%	21%
3	I prefer to read books with pictures	95%	5%
4	I understand the content of a book more easily when it is accompanied by pictures	79%	21%
5	I'd rather read a book than listen to the radio	84%	16%
6	I'd rather read a book than watch a video	74%	26%
7	I'd rather read a book than play games	53%	47%
8	I can easily get reading book materials	79%	21%
9	I can read books anywhere and anytime	68%	32%
10	I love books with colorful pictures	74%	26%
11	"I know what an earthquake is.	79%	21%
12	I know what the impact of an earthquake is.	58%	42%
13	I have felt an earthquake	74%	26%
14	I was scared of earthquakes	95%	5%
15	I know what to do when an earthquake strikes	68%	32%
16	I listened to my teacher's instructions when the earthquake occurred	89%	11%
17	I don't panic when an earthquake strikes	42%	58%
18	I know what disaster mitigation is.	37%	63%
19	I feel it's important to know about disaster mitigation	74%	26%
20	I feel like everyone needs to know about disaster mitigation	89%	11%

In the table above, it can be concluded that all students of grade IV A can read, but there are still 21% of students who still have difficulty explaining the content of the books they read. 95% of students prefer to read books with pictures, 74% of them like to read colorful books. Although there are some students who prefer to listen to the radio or watch videos, the researcher will develop a picture story book with the addition of board games to the picture story book according to the results of the needs analysis which shows that 53% of students prefer to play games rather than read books. Students' knowledge of earthquake disasters is more dominant, 74% of students have experienced earthquake disasters directly and feel it is important to know about disaster mitigation. The conclusions of the analysis strengthened the researcher to develop a learning medium for illustrated storybooks on earthquake disaster mitigation.

1. Phase Two Stages (design)

After conducting a needs analysis, an initial product design of a picture storybook will be made. At the design stage, the number of characters is determined, the adjustment of the storyline, the mood board for the characters and so on.

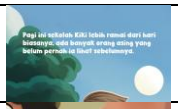
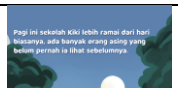
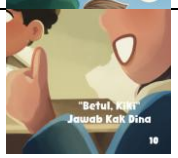
2. Phase Three Stages (development and implementation)

At this stage, the initial product design of picture story books began to be made into finished products. At this stage, the picture story book product will be validated by a material expert, Ferryl Ilyasa, M.Pd and a media expert, Dr. Mita Septiani, M.Pd.

3. Evaluation and Revision

After the product enters the development stage, the initial product will appear as a result of several previous stages, including the stages of needs analysis, design, development and implementation. Adjusting to the Hannafin and Peck model, at each stage evaluation and revision will be carried out according to criticism and suggestions from expert judges (media experts and material experts). The validation process received feedback in the form of suggestions and input from experts to improve the medium of picture storybooks. Here are the details of the improvement from the input of media experts, Dr. Mita Septiani, M.Pd:

Table 3. the details of the improvement from the input of media experts

Media Expert Suggestions and Inputs: Suggestion	Repair	
	Before	After
Book size is adjusted to the standard size of children's books	Book size 25.4 cm x 20.32 cm	Book size 20 cm x 20cm
The use of typefaces that make the letter 'K' look capitalized		
The color of the text is not contrasting		
Less consistent font size differences		
Add work instructions to the evaluation sheet	No workmanship instructions	
Add snake and ladder game instructions	No game instructions	

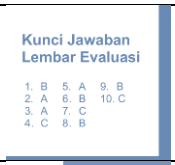
Add feedback to the evaluation sheet	No evaluation sheet feedback	
Add a page with a glossary and references	No glossary page	
Page position changed to the center of the page		
Placing the author's name under the title		

Table 4. Tabulation of Learners

	FERRYL					MITA 1					MITA 2				
Question	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1					V					V					V
2					V				V						V
3					V				V					V	
4					V					V					V
5					V					V					V
6					V					V					V
7					V				V						V
8				V						V					V
9					V					V				V	
10					V				V					V	
Total score	0	0	0	4	45	0	0	0	16	30	0	0	0	12	35
Total value	49					46					47				
Average	4.9					4.6					4.7				
Percentage	98%					92%					94%				
Criterion	Very valid					Very valid					Very valid				

1. Expert Tabulation

   The expert tabulation was carried out by three people with an average of 94.6%

2. Tabulation of Learners

Pre-test results

Table 5. Pre-test results

PARTICIPANT ANSWERS	PRE-TEST										**TOTAL SCORE**
	1	2	3	4	5	6	7	8	9	10	
1	1	1	0	1	1	0	0	1	1	0	6
2	0	1	0	1	1	0	1	1	1	0	6
3	0	1	0	0	0	0	0	0	1	0	2
4	1	1	0	0	1	1	1	0	1	1	7
5	0	1	1	0	1	1	1	1	1	1	8
6	1	1	1	0	1	1	1	1	1	1	9
7	1	0	1	0	1	0	0	1	0	1	5
8	1	1	1	0	1	1	1	1	1	0	8
9	1	1	0	1	1	0	1	1	1	1	8
10	0	1	1	0	1	1	1	1	0	1	7
11	1	1	0	0	1	1	1	1	0	1	7
12	1	1	1	0	1	1	0	1	1	0	7
13	1	0	0	0	0	1	0	0	1	0	3
14	1	1	1	0	1	1	1	0	1	0	7
15	0	1	1	1	1	1	0	1	1	0	7
16	1	1	1	0	1	1	0	1	1	0	7
17	1	1	0	1	1	1	0	1	1	1	8
18	1	0	1	0	1	0	1	1	1	0	6
19	0	1	1	1	1	1	1	1	1	1	9
20	1	1	0	0	1	1	1	1	0	1	7
21	1	1	1	0	1	0	1	1	1	0	7

Post-test results

Table 6. Post-test results

PARTICIPANT ANSWERS	POST-TEST										**TOTAL SKOR**
	1	2	3	4	5	6	7	8	9	10	
1	1	1	1	1	1	0	1	1	1	1	9
2	1	0	1	1	1	1	1	1	0	1	8
3	1	1	1	1	1	1	0	1	1	1	9
4	1	1	1	1	0	0	1	1	0	1	7
5	1	1	1	1	1	1	1	1	0	1	9
6	1	1	1	1	1	1	1	1	1	1	10
7	1	1	1	1	1	1	1	1	1	1	10
8	1	1	1	1	1	1	1	1	1	1	10
9	1	0	1	1	0	0	1	1	0	1	6
10	1	0	0	1	1	1	1	1	1	1	8
11	1	1	1	1	1	1	1	1	1	1	10
12	1	0	1	1	1	1	1	1	1	1	9
13	1	1	0	1	1	1	0	1	1	0	7
14	1	1	1	1	1	1	1	1	0	1	9
15	1	1	1	1	1	1	1	1	1	1	10
16	1	1	1	1	1	1	1	1	1	1	10
17	1	1	1	1	1	1	1	1	1	1	10
18	1	1	1	1	1	1	1	1	1	0	9
19	1	1	1	1	1	1	1	1	0	1	9
20	1	0	0	1	0	1	0	1	0	1	5
21	1	1	1	1	1	1	1	1	1	0	9

Table 7. Total Value Results

CONCLUSION

The process of developing picture storybooks goes through several stages, including: conducting a needs analysis, which is the first step in the process of developing picture storybooks. The needs analysis process was carried out using interview methods and questionnaires regarding picture storybooks and *knowledge* about earthquakes and their mitigation efforts. After the results of the needs analysis were obtained, the next step was to design the type of storybook to be developed according to the needs of the users (in this study, for students of *SD Negeri Tegal Ratu Cilegon*). The results of the validity test data, as assessed by the material validator, obtained an average score of 94.6% and achieved 90% attainment.

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