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Digital Library with Disaster Mitigation Content to Enhance Elementary Students' Reading Literacy and Environmental Care

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Abstract

Low reading literacy among Indonesian elementary students and the lack of disaster mitigation education in disaster-prone areas are serious issues that need immediate attention. This study examined the effectiveness of a digital library containing disaster mitigation illustrated stories in improving reading literacy and environmental care attitudes among elementary school students. This study used A quantitative one-group pretest–posttest design with 30 fourth-grade students selected through purposive sampling. Data were collected using a reading literacy test and a Likert-scale questionnaire measuring environmental care attitudes. Since the data were not normally distributed, the Wilcoxon Signed-Rank Test was applied. The results showed significant improvements in reading literacy ($p < 0.001$) and environmental care attitudes ($p < 0.001$), with all students demonstrating positive score gains. These findings indicate that integrating disaster mitigation narratives into digitally illustrated stories effectively supports literacy development and fosters environmental awareness in elementary education.

INTRODUCTION

Background of the Study

Literacy and character education are two fundamental aspects in basic education that are interrelated to form a generation that is smart, resilient, and cares about its environment (Sakti et al., 2024). In Indonesia, the low literacy skills of elementary school students are still a big challenge, especially if it is related to disaster preparedness, which requires knowledge-based understanding as well as positive character values (Marmoah et al., 2022; Suarmika et al., 2022). Disaster mitigation education from an early age is considered important because Indonesia is a disaster-prone country, but interesting and contextual learning materials are still limited (Triastari et al., 2021). In line with technological advancements, the integration of digital libraries based on illustrated stories presents a promising opportunity to enhance learning engagement, strengthen literacy, and instill character values, especially environmental care. Environmental care is an attitude that needs to be realized in everyday life to maintain, repair, and prevent damage and pollution of the environment (Purković et al., 2023; Quintero-Angel et al., 2023). Environmental care attitudes can be seen from behavioral responses in the form of actions or statements about behavior (Ardoin et al., 2015; Ertz et al., 2016).

Therefore, the innovation of a superior literacy program that combines digital picture stories with disaster mitigation messages is very relevant to be studied for its effectiveness in improving literacy and character of elementary school students (Bacalja et al., 2024).

PISA 2022 results show that Indonesian students' reading literacy levels are still far below the international average, emphasizing the need for more innovative literacy interventions (Bilad et al., 2024; OECD, 2023). Thus, literacy development in Indonesia tends to only emphasize aspects of technical reading skills, without integrating understanding of moral values or linkages to environmental issues such as disaster preparedness (Logayah et al., 2023). Therefore, it is important to explore whether the use of a digital library based on disaster mitigation picture stories is effective in improving literacy while instilling character values in elementary school students (Kim et al., 2024). In the 1970s, countries became aware of irreversible environmental disasters, and the first Conference on Humanity and the Environment was held in Stockholm in 1972. From this event, the idea of environmental education emerged (Borowy, 2019; Gök, 2012). Environmental care character is a manifestation of human attitudes toward the environment (Bonnett, 2017; Nazir & Pedretti, 2016). The environment is generally defined as all natural and artificial elements that condition human life (Van Den Bosch & Sang, 2017). In reality, there are still challenges, such as indifferent attitudes toward hygiene and low interest in environmental care, which indicate the need for more intensive and sustainable educational interventions (Hacieminoglu, 2016; Keramitsoglou, 2016).

Problem of the Study

Digital libraries have been shown to increase access to books as well as student engagement in reading activities (Dellia et al., 2024; Sarı Uğurlu, 2025). On the other hand, disaster mitigation materials taught in elementary schools are still often theoretical and less relevant to students' real-life conditions (Suarmika et al., 2022). The use of interactive digital media has been proven effective in increasing students' reading interest and comprehension (Susanti et al., 2025), while picture stories are considered capable of conveying moral values and shaping character in ways that are attractive to children (Rahiem et al., 2020). However, efforts to integrate disaster mitigation content into digital literacy media have not been carried out systematically at the elementary school level in Indonesia.

In many elementary schools, literacy instruction is still predominantly focused on basic decoding and textbook-based comprehension, with limited emphasis on contextual and critical reading skills. This is reflected in Indonesia's reading literacy performance, which remains below the international average and indicates difficulties in interpreting, evaluating, and relating texts to real-life situations (Bilad et al., 2024; OECD, 2023). In disaster-prone areas, these limitations are more critical, as students need literacy skills to understand environmental risks, recognize warning signs, and respond appropriately to disaster-related information. Without contextual integration, reading activities may not effectively support students' awareness and preparedness.

Furthermore, disaster education at the elementary level often remains fragmented and delivered separately from literacy and character education programs. Learning materials tend to emphasize factual knowledge about types of disasters rather than fostering environmental care attitudes and responsible behavior (Avcı, 2022; Logayah et al., 2023). As a result, students may understand disaster concepts theoretically but lack internalized environmental responsibility in daily life. This gap highlights the need for a more integrated approach that combines digital literacy media with disaster mitigation narratives to simultaneously strengthen reading competence and cultivate environmental care character systematically and contextually.

Research's State of the Art

Digital libraries have evolved from simple repositories of electronic books into interactive learning environments that support literacy development and digital competence. Studies show that digital libraries enhance students' reading engagement by providing flexible access to multimodal texts and diverse learning resources (Dellia et al., 2024; Kato et al., 2021). In elementary education, they also promote active learning by enabling independent exploration and improving information management skills, while helping teachers strengthen digital pedagogical competence in technology-enhanced classrooms (Appio et al., 2021; Tang & Chaw, 2016). Despite these advantages, most digital

library initiatives still emphasize accessibility and technological infrastructure rather than aligning content with contextual educational needs, such as disaster preparedness and character education.

Disaster mitigation education has gained increasing attention, particularly in countries vulnerable to natural hazards. Research highlights that disaster education at the primary level should move beyond theoretical explanations and incorporate contextual, experience-based learning to build preparedness and risk awareness (Avcı, 2022; Suarmika et al., 2022). Effective mitigation education also needs to integrate cognitive understanding with affective values such as responsibility, empathy, and environmental awareness (Paton, 2019). However, disaster education in elementary schools is often fragmented and not systematically integrated into literacy or character education programs (Logayah et al., 2023), indicating the need for innovative learning media that embed disaster mitigation messages in meaningful and accessible.

Reading literacy in elementary school involves not only decoding but also comprehension, interpretation, and the ability to relate texts to real-life contexts. Current literacy frameworks highlight the importance of multimodal learning, in which students interact with texts combining visual and verbal elements (Sun et al., 2022; Wedyawati et al., 2024). Evidence shows that digital and illustrated texts can improve reading comprehension and motivation, particularly among young learners (Liu et al., 2024), while picture storybooks support deeper understanding by linking narrative structures with visual representations (Strouse et al., 2018). However, literacy instruction often remains focused on technical skill development, with limited integration of contextual themes such as environmental issues and disaster awareness. As a result, reading activities may not fully contribute to the development of students' critical awareness and preparedness for real-life challenges.

Environmental care character in elementary school students refers to the development of attitudes and behaviors reflecting responsibility toward environmental sustainability. Character education research shows that such values are more effectively internalized when presented through meaningful narratives and real-life contexts (Chen, 2022; Nugroho et al., 2023). Studies in environmental education also indicate that early exposure to sustainability-related content fosters long-term pro-environmental attitudes (Ardoin & Bowers, 2020; Rudyanto et al., 2023). However, previous studies have examined digital literacy, disaster education, reading comprehension, and environmental character separately, with limited efforts to integrate these components into a single instructional model. Therefore, a research gap remains in developing and empirically testing a contextual digital library that simultaneously promotes reading literacy and environmental care character through disaster mitigation narratives in elementary education.

Gap Study and Objective

Previous studies have demonstrated that digital libraries contribute positively to students' reading engagement and access to diverse learning resources (Dellia et al., 2024; Kato et al., 2021). Research also indicates that technology-integrated literacy instruction can enhance comprehension and motivation among elementary learners (Liu et al., 2024; Susanti et al., 2025). In parallel, disaster mitigation education has been emphasized as an essential component of primary education in disaster-prone countries, including Indonesia (Logayah et al., 2023; Suarmika et al., 2022). Effective disaster education should not only provide conceptual understanding but also foster preparedness attitudes and responsible environmental behavior (Avcı, 2022; Paton, 2019). Furthermore, illustrated storybooks and multimodal narratives have been proven to support literacy development while simultaneously shaping character values in young learners (Chen, 2022; Strouse et al., 2018). Studies on environmental education reveal that early exposure to contextual sustainability content positively influences students' environmental care attitudes (Ardoin & Bowers, 2020; Nugroho et al., 2023). However, prior research tends to examine digital literacy, disaster education, reading comprehension, or environmental character formation separately. Limited empirical studies have systematically integrated these four domains within a single digital library-based instructional model, particularly at the elementary school level.

This gap indicates the need for an integrated digital literacy approach that embeds disaster mitigation narratives into illustrated digital storybooks to enhance both reading literacy and

environmental care character. Therefore, this study aims to develop and examine the effectiveness of a digital library containing illustrated disaster mitigation stories in improving elementary students' reading literacy and environmental care attitudes. The study addresses the following research questions: (1) Does the implementation of a disaster mitigation–based digital library significantly improve students' reading literacy? (2) Does the implementation of the digital library significantly enhance students' environmental care attitudes?. The novelty of this research lies in the integration of digital literacy, disaster mitigation education, reading literacy development, and environmental character formation within a single contextual and technology-based learning model tailored to the characteristics of elementary students in disaster-prone areas.

METHOD

Type and Design

This study used a quantitative research approach using a pre-experimental design with one-group pretest–posttest design to examine the effect of the digital library intervention on students' reading literacy and environmental care attitudes by comparing their performance before and after the treatment. The absence of a control group reflects the practical conditions of classroom-based implementation while still allowing the measurement of changes resulting from the intervention. The study was conducted in three main stages. First, students were given a pretest to measure their initial reading literacy skills and environmental care attitudes. Second, the intervention was implemented through learning activities using a digital library containing illustrated stories with disaster mitigation content. The digital library was integrated into classroom instruction over a specified learning period. Finally, a posttest was administered to assess changes in students' reading literacy and environmental care attitudes after the intervention. The use of this design aligns with the objective of the study, which is to determine whether the implementation of a disaster mitigation-based digital library can significantly improve reading literacy and foster environmental care character among elementary school students. By comparing pretest and posttest results, the study aims to identify measurable improvements attributable to the digital library intervention.

Data and Data Sources

The data collected in this study consisted of two main types: (1) quantitative data from students' reading literacy test scores and (2) quantitative data from students' environmental care attitude questionnaires. The reading literacy data were obtained from students' responses to pretest and posttest instruments, while the environmental care attitude data were collected through a Likert-scale questionnaire completed by the students before and after the intervention. All data sources were derived directly from the participating students. In addition, documentation data were gathered during the implementation of the digital library to support the description of the intervention process.

The participants were 30 fourth-grade students from the elementary school Gading, aged between 9 and 10 years. The sample consisted of 16 male students and 14 female students. The school was selected through purposive sampling based on several considerations, including the availability of basic digital facilities, the school's location in a disaster-prone area, and students' prior exposure to basic reading instruction and introductory disaster-related topics. All selected students participated fully in both the pretest and posttest stages, ensuring data completeness for paired analysis. The disaster mitigation-based illustrated storybooks were uploaded and integrated into the school's digital library platform as part of the intervention.

Data Analysis

This study formulated statistical hypotheses to examine the effect of the disaster mitigation-based digital library intervention on students' reading literacy and environmental care attitudes. The hypotheses were formulated separately for each variable as follows:

H_{o1}: There is no significant difference in students' reading literacy scores before and after the implementation of the disaster mitigation-based digital library.

H_{11}: There is a significant difference in students' reading literacy scores before and after the implementation of the disaster mitigation-based digital library.

H_{o2}: There is no significant difference in students' environmental care attitudes before and after the implementation of the disaster mitigation-based digital library.

H_{12}: There is a significant difference in students' environmental care attitudes before and after the implementation of the disaster mitigation-based digital library.

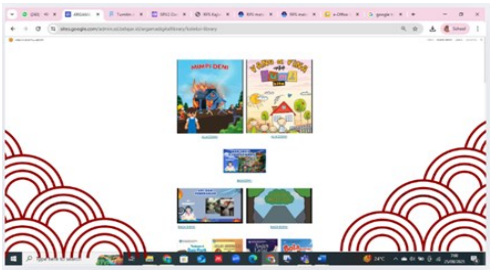
Before conducting hypothesis testing, a prerequisite test was carried out in the form of a data normality test. The normality test aimed to determine whether the pretest and posttest data were normally distributed. The Shapiro–Wilk test was used, with the criterion that data are considered normally distributed if the significance value (Sig.) is greater than 0.05. Since the results of the normality test indicated that the data were not normally distributed, the hypothesis testing was conducted using the Wilcoxon Signed-Rank Test. This non-parametric test is appropriate for analyzing paired data to determine whether there are significant differences between pretest and posttest scores at a significance level of 0.05.

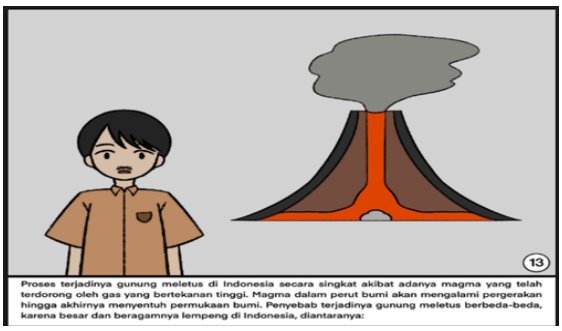
RESULTS

Before presenting the results of the digital library development shown in Table 1, it is necessary to describe the learning syntax implemented during the intervention. The learning activities were organized into three main stages: preliminary activities, core activities, and closing activities. In the preliminary stage, the teacher began by greeting the students, checking attendance, and motivating them through questions related to daily environmental issues and disaster experiences in their surroundings. The teacher then introduced the learning objectives and explained that students would use a digital library containing illustrated storybooks with disaster mitigation content. This stage aimed to activate students' prior knowledge and prepare them for the learning process.

In the core activities, students accessed the digital library and read the illustrated disaster mitigation storybooks individually or in small groups. The digital library can be accessed through the following link: http://bit.ly/4wkpg7A . The teacher guided students to identify key information, discuss disaster prevention strategies presented in the stories, and relate the content to real-life environmental conditions. Interactive discussions, question-and-answer sessions, and short reflection tasks were conducted to strengthen reading comprehension and encourage the development of environmental care attitudes. In the closing stage, students were invited to summarize the main ideas of the story and reflect on the importance of disaster preparedness and environmental responsibility. The teacher provided feedback, reinforced key concepts, and concluded the lesson by emphasizing practical actions students could apply in their daily lives.

Table 1. Results of the Development of the Digital Library and the Illustrated Disaster Mitigation Storybook

Display	Description
	Display of the digital library in the elementary school.

Display	Description
	Display of the illustrated storybook with the theme of fire. It narrates the causes and effects of fire, accompanied by ways to overcome it.
	Display of the illustrated storybook with the theme of flooding. It tells about how to take care of the environment to prevent flooding and to keep the surroundings clean and healthy.
	Display of the illustrated storybook with the theme of a volcanic eruption and how to be prepared for it.

The normality test was conducted to determine whether the pretest and posttest data of the two variables were normally distributed or not. This test uses the Shapiro-Wilk method through the SPSS program, and the following results are obtained: (see Table 2)

Table 2. Normality Test Results

Class	Data	Shapiro Wilk	Level	Description
Reading Literacy	Pretest	Sig. 0,011	0,05	Normal
	Posttest	Sig. 0,002	0,05	Not Normal
Environmental Care Attitude	Pretest	Sig. <0.001	0,05	Not Normal
	Posttest	Sig. <0.001	0,05	Not Normal

The decision-making criteria in the normality test are as follows: If the significance value (Sig.) > 0.05, then the data is normally distributed. If the significance value (Sig.) < 0.05, then the data is not normally distributed. Based on the SPSS output, the Shapiro–Wilk test shows that the significance values for the pretest and posttest data on reading literacy and environmental care attitude variables are all < 0.05, indicating that the data are not normally distributed. After the normality test is carried out and it is known that the data is not normally distributed, then hypothesis testing is carried out using a non-parametric test, namely the Wilcoxon Signed-Rank Test. This test was used to determine the differences between pretest and posttest scores for reading literacy and environmental care attitudes. The Wilcoxon test was selected because the data were not normally distributed, so

parametric tests such as the paired t-test could not be applied. The results of the Wilcoxon test are presented in Table 3.

Table 3. Reading Literacy Ranks Test Results

Ranks	N	Mean Rank	Sum of Ranks
Negative Ranks	0	0,00	0,00
Positive Ranks	30	15,50	465,00
Ties	0	-	-
Total	**30**		

Table 3 shows that all participants (30 students) experienced an increase in reading literacy scores after the treatment, which can be seen from all data in the positive ranks category. There were no students who experienced a decrease in scores (negative ranks = 0) or scores that did not change (ties = 0).

Table 4. Test Statistics of Reading Literacy

	Reading Literacy
Z	-4,867
Asymp. Sig. (2-tailed)	<0,001

Table 4 shows the Wilcoxon test results, Asymp. Sig. (2-tailed) is obtained as <0.001. This value is smaller than the specified significance level (α = 0.05), so it can be concluded that there is a significant difference between the pretest and posttest scores of Reading Literacy. These results indicate that there was an increase in students' reading literacy skills after the treatment or intervention was given. In other words, the intervention carried out during the learning process has a positive influence on improving students' reading literacy.

Table 5. Results of the Ranks Test for Environmental Care Attitude

Ranks	N	Mean Rank	Sum of Ranks
Negative Ranks	0	0,00	0,00
Positive Ranks	30	15,50	465,00
Ties	0	-	-
Total	**30**		

Table 5 shows that the Wilcoxon Signed Ranks test was used to determine the significant difference between pretest and posttest scores on the student environmental awareness variable. Based on the "Ranks" table, there are 30 students (100%) who experienced an increase in posttest scores compared to the pretest (Positive Ranks), no students experienced a decrease in scores (Negative Ranks = 0), and no fixed values were found (Ties = 0).

Table 6. Test Statistics of Environmental Care Attitude

	Reading Literacy
Z	-4,855
Asymp. Sig. (2-tailed)	<0,001

Table 6 shows that the test results show a Z value of -4.855 and a significance value of< 0.001. Since this significance value is far below the limit of α = 0.05, it can be concluded that the difference in pretest and posttest scores is statistically significant. This means that the increase in scores is not due to chance factors, but rather due to the real influence of the learning intervention provided. The descriptive statistics of students' reading literacy scores before and after the implementation of the disaster mitigation-based digital library are presented in Table 7.

Table 7. Descriptive Statistics of Reading Literacy Scores

Statistic	Pretest	Posttest
Mean	77.83	86.50
Standard Deviation	8.89	7.07
Minimum	60	70
Maximum	90	95
Total Score	2335	2595
Mean Increase	8.67	

Table 7 shows that students' reading literacy scores improved after the intervention. The mean score increased from 77.83 in the pretest to 86.50 in the posttest, indicating an average gain of 8.67 points. The standard deviation decreased from 8.89 to 7.07, suggesting that students' achievement became more consistent after using the digital library. The minimum score improved from 60 to 70, while the maximum score increased from 90 to 95. In addition, the total score rose from 2335 to 2595, demonstrating an overall improvement in students' reading literacy performance. The descriptive statistics of students' environmental care attitude scores before and after the intervention are presented in Table 8.

Table 8. Descriptive Statistics of Environmental Care Attitude Scores

Statistic	Pretest	Posttest
Mean	80.67	90.33
Standard Deviation	5.44	4.26
Minimum	70	85
Maximum	90	95
Total Score	2420	2710
Mean Increase	9.66	

Table 8 shows a significant improvement in students' environmental care attitudes following the implementation of the digital library. The mean score increased from 80.67 to 90.33, reflecting an average gain of 9.66 points. The standard deviation decreased from 5.44 to 4.26, showing greater consistency in students' responses. The minimum score rose from 70 to 85, while the maximum score increased from 90 to 95. Furthermore, the total score improved from 2420 to 2710, suggesting that the intervention effectively strengthened students' environmental care character. To provide a clearer visualization of the improvement in both variables, a graphical comparison of the pretest and posttest mean scores was conducted. The figure below illustrates the differences in students' reading literacy and environmental care attitude before and after the implementation of the disaster mitigation-based digital library intervention.

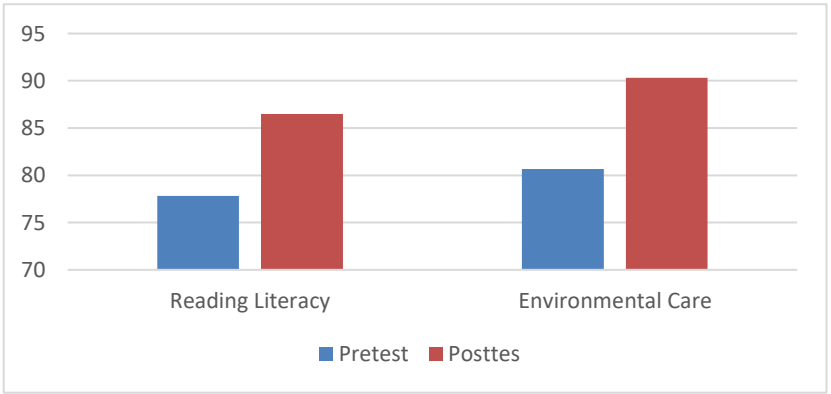


Figure 1. Comparison of Pretest and Posttest Mean Scores in Reading Literacy and Environmental Care Attitude

Figure 1 shows a clear increase in mean scores from pretest to posttest for both variables. In reading literacy, the mean score increased from 77.83 to 86.50. Similarly, in environmental care attitude, the mean score improved from 80.67 to 90.33. The graphical representation confirms that the implementation of the disaster mitigation-based digital library contributed to measurable improvements in both students' reading literacy and their environmental care character.

DISCUSSIONS

This study aimed to determine whether the implementation of a disaster mitigation-based digital library could improve students' reading literacy and environmental care character. The findings indicate that both variables experienced statistically significant improvements after the intervention. The Wilcoxon Signed-Rank test results showed that the significance value for reading literacy was below 0.05, confirming that there was a meaningful difference between pretest and posttest scores. Similarly, environmental care attitude scores also increased significantly. These findings answer the research question by demonstrating that the integration of disaster mitigation content into a digital picture story-based library has a measurable positive impact on both cognitive and character dimensions of elementary school students.

The improvement in reading literacy can be explained through the multimodal nature of digital picture storybooks. Digital libraries that combine visual illustrations, narrative texts, and interactive access have been shown to enhance comprehension and reading engagement (Niland, 2023; Strouse et al., 2018; Wei & Ma, 2020). Recent studies also emphasize that digital reading platforms increase students' motivation and access to diverse reading materials, which ultimately improves literacy outcomes (Dey & Munshi, 2025; Prastiti & Adi, 2024). The findings of this study are consistent with Liu et al. (2024), who reported that illustrated digital reading materials significantly improved elementary students' comprehension skills. Compared to previous studies that focused mainly on general literacy improvement, this research extends the contribution by embedding disaster mitigation themes within the reading materials. This thematic integration not only supports comprehension but also contextualizes literacy learning within real-life issues relevant to students.

From a character education perspective, the significant increase in environmental care attitude indicates that narrative-based digital media can function as an effective medium for value internalization. Environmental education scholars argue that early exposure to environmental themes fosters not only knowledge but also pro-environmental attitudes and behaviors (Ardoin & Bowers, 2020; Chen, 2022). The North American Association for Environmental Education emphasizes that meaningful environmental learning should connect knowledge, attitudes, and action. In this study, disaster mitigation stories presented relatable scenarios, empathy-driven narratives, and practical examples of environmental responsibility. This finding aligns with Nugroho et al. (2023) and Putra et al. (2023), who found that contextual storytelling significantly strengthens students' environmental awareness and responsibility. Compared with prior research that often separates literacy instruction from character education, this study demonstrates that both domains can be integrated effectively within a single digital learning model.

The integration of disaster mitigation content also addresses a common limitation in elementary education, where disaster education is often delivered in a theoretical and fragmented manner (Avcı, 2022). By embedding mitigation messages within illustrated narratives, abstract disaster concepts become more concrete and meaningful to children. Research by Kovačevič & Barbir (2024) indicates that learning grounded in authentic social contexts produces stronger character formation outcomes. Similarly, recent findings suggest that digital platforms can enhance student engagement and facilitate deeper understanding when aligned with contextual issues (Appleton, 2020; Prastiti & Adi, 2024). The present study supports these arguments, as students showed high enthusiasm and active participation during reading and discussion sessions, indicating that digital storytelling can bridge literacy development with socio-environmental awareness.

Overall, the findings of this study contribute to the growing body of literature highlighting the effectiveness of digital libraries in elementary education. However, unlike previous studies that primarily examined digital literacy or environmental education separately, this research offers an

integrative model that simultaneously improves reading literacy and environmental care character through disaster mitigation-themed digital storybooks. Therefore, the disaster mitigation-based digital library can be considered a promising innovation in elementary education, particularly in contexts where literacy development and environmental awareness are equally urgent educational priorities.

CONCLUSION

This study demonstrates that the implementation of a disaster mitigation-based digital library significantly improves elementary school students' reading literacy and environmental care attitudes. The integration of illustrated digital storybooks containing contextual disaster mitigation messages provides a dual impact on cognitive and affective domains. The novelty of this research lies in its integrative model that combines digital literacy development, disaster education, and environmental character formation within a single instructional framework. Unlike previous studies that tend to focus separately on digital literacy or environmental education, this study offers empirical evidence that contextual digital storytelling can simultaneously strengthen reading comprehension and foster environmental responsibility. Thus, this research contributes to the advancement of elementary education by proposing a technology-based literacy model that responds to both academic and socio-environmental challenges in disaster-prone contexts. Despite the positive findings, this study has several limitations. The use of a one-group pretest–posttest design without a comparison group limits the strength of causal inference. In addition, the study involved a relatively small sample from a single elementary school, which may restrict the generalizability of the findings to broader educational settings. Future research is recommended to employ quasi-experimental or true experimental designs involving control groups and larger samples from diverse regions. Longitudinal investigations are also needed to examine whether improvements in literacy skills and environmental care attitudes are sustained over time. Further studies may also explore the integration of additional character education values or different thematic contents to enrich the digital library model. The findings imply that digital libraries enriched with disaster mitigation content can serve as an innovative and practical instructional medium in elementary education. Teachers are encouraged to integrate contextual digital storybooks into literacy instruction to promote both reading competence and character development. Schools and policymakers may consider supporting the development of digital learning platforms that embed environmental and disaster awareness themes as part of character education programs. By systematically incorporating contextual digital media into classroom practice, elementary education can better prepare students to become literate, environmentally responsible, and socially aware citizens in the digital era.

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