Are *Scrapbook*s Able to Increase Tsunami Disaster Literacy? An Analytical Study of Junior High School Students Materials

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Tsunami disaster mitigation is a crucial aspect of enhancing community preparedness, particularly among junior high school students in tsunami-prone areas. However, students' disaster literacy remains low due to the lack of engaging and interactive learning media. This study aims to develop and evaluate the effectiveness of Scrapbook-based learning media in improving students' tsunami disaster literacy. Using a Research and Development (R&D) approach, this study follows the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) and employs a mixed-method approach combining quantitative and qualitative methods. The research involved four expert validators (material, media, language, and disaster mitigation practitioners) and 65 students from Al-Amin Junior High School, with an initial trial conducted on 15 students. The validation results indicate that the developed Scrapbook media is valid, with an average assessment score of 84%. The paired sample t-test revealed a significant improvement in students' disaster literacy, with a significance value of 0.000 < 0.005. These findings demonstrate that Scrapbook media effectively enhances students' understanding of tsunami disaster mitigation. The implications of this study highlight the importance of integrating interactive and visually engaging learning media into disaster education curricula to foster student engagement and strengthen their preparedness for future disasters.

Keywords: Media Disaster Literacy; Tsunami Mitigation; Learning Media; Scrapbook; ADDIE Model

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INTRODUCTION

Disasters are a series of events that threaten and disrupt the lives and livelihoods of communities, caused by natural, non-natural, or human factors, resulting in loss of life, environmental damage, property loss, and psychological impacts (Azizah et al., 2021; Sayuti et al., 2021). Natural disasters are inherently unpredictable, necessitating constant vigilance from society (Sayuti et al., 2021). Indonesia is among the countries with a high susceptibility to natural disasters (Fuady et al., 2021). According to the World Risk Report 2018, Indonesia ranked 36th out of 172 countries most prone to natural disasters, with a risk index of 10.36 (Adri et al., 2020; Apriyadi & Amelia, 2020). This vulnerability contributes to the frequent occurrence of earthquakes, tsunamis, and volcanic eruptions. Notably, a major earthquake followed by a tsunami struck Palu, Central Sulawesi (Waloejo et al., 2021). Data from the National Disaster Management Agency (BNPB) indicates that the 2018 earthquake and tsunami in Palu resulted in 2,081 fatalities, 4,612 severe injuries, and displaced 223,751 individuals across 122 locations (Fuady et al., 2021; Rosyida et al., 2019; Waloejo et al., 2021).

The World Economic Forum's Global Risks Report 2024 emphasizes that extreme weather events are anticipated to become even more severe, ranking as the top risk over the next decade (World Economic Forum, 2025). This underscores the critical need for enhanced disaster preparedness and literacy among vulnerable populations (Suwaryo et al., 2021). Furthermore, McKinsey & Company's research on education highlights the importance of innovative educational tools in building resilience and knowledge among students. In this context, exploring the effectiveness of scrapbooks as educational tools could provide valuable insights into improving tsunami disaster literacy among junior high school students.

Based on the aforementioned data, it can be concluded that the level of public awareness in Indonesia remains low in understanding effective information to minimize casualties during disasters. This issue stems from the lack of disaster literacy among the population (Septaria, 2023; Zahara, 2019). A study conducted by (Fadilah et al., 2020) further supports this claim, revealing that students' scientific literacy regarding disasters remains insufficient. Therefore, literacy initiatives or public awareness programs should not be solely the responsibility of the government but should also involve higher education institutions (Nawiyanto & Arianto, 2022; Prastyo et al., 2021).

The majority of respondents across Indonesia acknowledge that they lack knowledge about appropriate and relevant media to serve as disaster risk awareness tools (Sari & Apriyantika, 2020). Study found that 47% of respondents admitted they were either unaware or had limited knowledge regarding effective disaster education media (Hadi et al., 2019; Marasabessy & Samad, 2021; Muhlisah et al., 2021). This percentage increases to 63% when including those who responded neutrally, indicating a tendency toward uncertainty (Prihatin, 2018). The government is also aware that if citizens are entirely uninformed, it will inevitably lead to a low awareness of disaster risks in vulnerable areas (Azizah et al., 2021; Ruman et al., 2023).

To enhance disaster literacy, an educational medium is required to provide stimulating and accessible information about potential hazards (Prakoso et al., 2021). This approach serves as a fundamental effort in fostering a culture of disaster preparedness, particularly for children from an early age (Nuraeni et al., 2020; Puspaningrum, 2022). Educational media act as tools that facilitate information dissemination and learning processes. These media can take various forms, including live audio, recorded sound, printed materials, transparencies, images, and other multimedia resources (Rahiem & Widiastuti, 2020).

One alternative that can be used to enhance disaster literacy is the use of scrapbooks as an educational medium. A scrapbook is a learning tool that incorporates artistic elements, designed with images adapted into a photo album using recycled materials, which are then arranged creatively on paper (Rosyidah et al., 2019; Shinta et al., 2023; Syahrum et al., 2021). Scrapbooks can serve as an engaging way to deliver information in learning activities, making them not only an effective educational tool but also a memorable keepsake for students (Muktadir & Wardhani, 2022; Syahrum et al., 2021).

A scrapbook, as a learning medium, consists of pasted images applied to paper. Literally, the term "scrapbook" refers to cut-out or fragmented pieces of paper that are arranged to convey a story (Dewi & Yuliana, 2018; Shinta et al., 2023; Wusqo et al., 2021). Through this approach, scrapbooks provide an interactive and visually appealing method of learning, making complex topics, such as disaster preparedness, more accessible and engaging for students.

Based on interviews conducted with three science teachers at SMP Al-Amin Paciran on Wednesday, January 11, 2023, several key findings emerged regarding disaster education in schools: (1) the development of learning media remains extremely limited, with only a 10% increase in media development over the past five years; (2) 80% of teachers have never developed teaching materials or learning media specifically for disaster mitigation topics; (3) disaster mitigation content is only delivered theoretically in the classroom, leaving students to rely on imagination without any concrete or hands-on experiences, which results in low engagement; (4) over the past two years, only 35% of students

have met the school's minimum competency standard (KKM) of 77 in science subjects, as the school is in a transitional phase from the 2013 Curriculum to the Merdeka Curriculum; and (5) observations of lesson plans (RPP) over one year revealed that disaster-related content is allocated only one lesson hour, despite the school being located in a tsunami-prone coastal area along the northern coast of Java. These findings highlight the urgent need for the development and implementation of tsunami disaster education media.

As previously recognized, Disaster Preparedness Education can be delivered through various media and methods (Nuraeni et al., 2020; Saldy et al., 2020). It plays a crucial role in school curricula and can be integrated into the school-based curriculum (KTSP), whether in the 2013 Curriculum or the currently implemented Merdeka Curriculum (Prasetyo et al., 2021; Septaria et al., 2023). Both curricula offer multiple opportunities to incorporate disaster preparedness programs within school activities, either as part of the regular curriculum or through extracurricular initiatives. Furthermore, national education policies regarding disaster preparedness education allow its implementation in two ways: (1) by integrating it into existing subjects or (2) by establishing it as a standalone subject under local content (muatan lokal). These approaches reinforce the importance of equipping students with disaster literacy to enhance their awareness and preparedness in high-risk areas.

Relevant research by (Rahiem & Widiastuti, 2020) suggests that learning media in the form of visual aids or tangible models can significantly enhance students' comprehension of complex and abstract topics. This is further supported by studies conducted by (Chang et al., 2013; Septaria, 2019; Wardhani, 2018) , which indicate that students often struggle to visualize abstract concepts or topics they have not personally experienced. However, this difficulty can be mitigated through interactive learning media that students can physically engage with.

Despite the existing research highlighting the effectiveness of visual and interactive learning media in improving students' comprehension of abstract concepts (Rahiem & Widiastuti, 2020; Chang et al., 2013; Septaria, 2019; Wardhani, 2018), there remains an empirical and practical-knowledge gap in the application of such media for disaster literacy, specifically in tsunami mitigation education. While prior studies have explored the general use of visual learning tools, there is a lack of empirical evidence regarding the effectiveness of scrapbooks in conveying disaster-related content to students in tsunami-prone areas. Additionally, most disaster education research focuses on theoretical instruction or digital-based media, neglecting the potential of hands-on, tangible learning tools like scrapbooks. Furthermore, the population gap is evident, as previous studies have not

specifically targeted junior high school students in coastal areas, a demographic that is highly vulnerable to tsunami disasters but often overlooked in disaster preparedness education.

Learning media that are both unique and familiar in daily life tend to be quickly adopted by students, allowing them to absorb information more effectively—whether through usage, collaborative activities, or group-based educational interactions (Nurjannah & Hatimah, 2023; Putri et al., 2021). The novelty of this study lies in its focus on scrapbooks, which are traditionally used for personal celebrations such as birthdays, graduations, and similar events. However, the developed scrapbook media in this research aims to enhance students' enthusiasm for disaster mitigation learning while simultaneously improving tsunami disaster literacy, particularly in schools located in Indonesia's coastal regions.

This study introduces a novel approach by repurposing scrapbooks—commonly used for personal memorabilia—into an engaging and interactive educational tool for tsunami disaster literacy. Unlike previous research that primarily focuses on digital or conventional visual media, this study offers a new methodological innovation by utilizing scrapbooks as a multi-sensory learning medium that combines visual, tactile, and cognitive engagement to enhance students' disaster preparedness. The research also presents a theoretical advancement by integrating disaster mitigation principles into an unconventional learning framework, contributing to the broader field of science education. Empirically, this study fills the gap by providing concrete data on the effectiveness of scrapbooks in improving tsunami disaster literacy among junior high school students in coastal Indonesia. Furthermore, the findings of this study have practical implications for policymakers and educators, offering a cost-effective and easily implementable strategy to integrate disaster preparedness into school curricula, particularly in regions with limited access to digital learning resources.

This study is highly urgent due to the critical need for early education on tsunami disaster mitigation in Indonesia's coastal areas. Given Indonesia's high susceptibility to earthquakes and subsequent tsunamis, proactive disaster education is essential. Furthermore, the absence of a comprehensive tsunami warning system in Lamongan and its surrounding areas further underscores the necessity of developing effective disaster education tools. By introducing scrapbooks as an engaging and tangible learning medium, this research seeks to bridge the gap in disaster preparedness education and foster a culture of disaster awareness among students in tsunami-prone regions.

The findings of this study have significant implications for junior high school students in tsunami-prone coastal areas, both in the present and over the next decade. By integrating

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scrapbooks as an interactive learning medium, this research equips students with 21st-century skills, particularly critical thinking, problem-solving, creativity, collaboration, and communication, as they actively engage in disaster preparedness education. In the short term, this approach fosters better tsunami disaster literacy, ensuring that students understand early warning signs, emergency response actions, and mitigation strategies, ultimately increasing their resilience to potential disasters. Looking ahead to the next 10 years, the widespread implementation of this method could contribute to Sustainable Development Goal (SDG) 4: Quality Education, by enhancing disaster education in vulnerable communities, and SDG 13: Climate Action, by fostering a generation that is more aware and prepared for climate-related disasters such as tsunamis. Additionally, this research supports SDG 11: Sustainable Cities and Communities, as educated students can become proactive agents of change in their communities, advocating for disaster risk reduction strategies and promoting a culture of resilience. By aligning disaster education with hands-on, innovative learning strategies, this study ensures that future generations are better equipped to navigate and mitigate the impacts of natural disasters, creating a safer and more prepared society.

METHOD

This study employs a Research and Development (R&D) approach. Research and Development is defined as a research method that aims to produce a product and test its effectiveness (Edi Supartawan et al., 2021; Shinta et al., 2023). The researcher developed an instructional media using the ADDIE model, which is designed to systematically create instructional systems through a structured and detailed process (Laksono & Widiyatmoko*, 2022; Wardhani, 2018). The ADDIE model consists of five key stages: (1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation (Laksono & Widiyatmoko, 2022).

The selection of the ADDIE model is highly relevant to this study's objective, as it ensures a systematic and iterative approach in developing an educational scrapbook to enhance tsunami disaster literacy among junior high school students (Laksono & Widiyatmoko, 2022; Luh Nyoman Gita Acyuta Dewi et al., 2024; S. Matana et al., 2024). The analysis phase allows for an in-depth understanding of students' prior knowledge and learning needs regarding tsunami preparedness. The design and development stages facilitate the creation of an engaging and pedagogically sound scrapbook, integrating scientific literacy with disaster risk reduction strategies. The implementation phase ensures that the scrapbook is tested in real classroom settings, while the

evaluation stage provides critical insights into its effectiveness in improving students' tsunami disaster literacy. By following this structured model, the study ensures the development of an effective and evidence-based educational tool that can significantly contribute to disaster education efforts.

[Figure 1 about here.]

This research was conducted at Al Amin Junior High School (SMP Al Amin) Paciran, located at Jl. Raya Deandles No. 113, Tunggul Village, Paciran District, Lamongan Regency, East Java Province. The study took place between December 2022 and May 2023. It was designed as an educational context for junior high school students to enhance their understanding of disaster mitigation, particularly regarding tsunamis.

The validation process for the instructional materials and the scrapbook media involved four categories of experts: (1) a Science Education Expert, (2) a Language Expert, (3) a Media and Instructional Technology Expert, and (4) a Disaster Mitigation Practitioner. The science expert was a faculty member from a university in Surabaya specializing in science education, while the language expert was a lecturer from the Language Education Program, specializing in the Indonesian language. The media expert was a professor from a state university in Surabaya with expertise in instructional technology, and the disaster mitigation practitioner was a specialist from the Regional Disaster Management Agency (BPBD) of Lamongan Regency.

During the implementation phase, the research subjects were divided into two categories: (1) a limited trial class involving 15 students (8 female and 7 male) aged 13–14 years, all residing in coastal areas, with 80% of their parents working as fishermen; and (2) a final trial involving 65 students divided into two learning groups: Class VII A and Class VII B, consisting of 32 and 33 students, respectively. Class VII A comprised 15 male and 17 female students, with an average age of 14 years, while Class VII B included 19 female and 14 male students. During the limited trial phase, the focus was on collecting feedback and suggestions to refine the scrapbook media before its full implementation in the final trial class. This step ensured that the developed instructional tool was effective, engaging, and aligned with the students' learning needs before being tested on a larger scale.

The data collection methods used in this research include: (1) Interviews, aimed at identifying existing issues in the school environment as well as challenges faced by teachers when teaching science on the topic of disaster mitigation; (2) Questionnaires, used to collect validation results from four experts—science education experts, language experts, instructional media experts, and disaster mitigation

practitioners; (3) Tests, employed to assess students' cognitive achievements and to measure their understanding of tsunamis and disaster literacy after utilizing the Scrapbook media developed by the researcher.

The research instruments used for data collection include: (1) Interview sheets, conducted with three science teachers at SMP Al Amin Paciran; (2) Validation questionnaires for expert evaluation; and (3) Cognitive and disaster literacy test sheets, consisting of 20 multiple-choice questions developed by the researcher and validated by expert validators. A Likert scale was used to measure expert validation, as it is effective in assessing attitudes, opinions, and perceptions of individuals or groups regarding social phenomena (Qolbyatin et al., 2023; Ramlo, 2021).

The collected data consists of qualitative and quantitative data. The qualitative data was analyzed using descriptive analysis, particularly feedback and suggestions from validators during the instructional material validation phase and student feedback during the trial phase. The quantitative data was derived from students' pre-test and post-test results on tsunami disaster literacy. The effectiveness of the treatment was assessed using SPSS version 26, employing the Paired Sample T-Test to analyze correlations. The impact of the intervention was measured by comparing pre-test and post-test scores of the full sample (65 students) after the implementation of Scrapbook media in tsunami disaster mitigation lessons.

In general, the data analysis in this study consists of: (1) Analysis of the validity of instructional media, which is then compared against established validity criteria for Scrapbook media; and (2) Analysis of students' disaster literacy test results, conducted using SPSS version 26 to assess the validity of the literacy test instrument, as well as to perform homogeneity, normality, and t-tests to determine the impact of Scrapbook media on students' disaster literacy.

RESULT AND DISCUSSION

The development of the Scrapbook instructional media was conducted using the ADDIE model between December 2022 and April 2023 at SMP Al-Amin, Paciran, Lamongan. Each phase in the ADDIE development model produced significant outputs that directly addressed critical gaps in tsunami disaster education. In the analysis phase, the findings revealed substantial deficiencies in the existing instructional approach to disaster mitigation. The development of instructional media had remained stagnant, with only 10% progress in media innovation over the past five years, indicating a lack of significant advancements in integrating engaging educational tools. Furthermore, 80% of teachers had never developed instructional materials or media related to disaster mitigation,

suggesting a gap in pedagogical capacity and innovation. Disaster mitigation lessons were primarily theoretical, causing students to rely entirely on imagination without exposure to concrete visualizations or hands-on experiences, leading to low engagement and minimal retention. This theoretical delivery limited students' ability to grasp the real-world implications of tsunami disasters and the necessary mitigation strategies.

Additionally, academic performance data over the past two years highlighted that only 35% of students achieved the minimum competency criteria (KKM) score of 77 in science subjects, suggesting that existing instructional methods were insufficient in fostering comprehension and literacy related to disaster preparedness. Observations of lesson plans (RPP) over a one-year period among three science teachers further revealed that only one instructional session per year explicitly addressed disaster topics, despite the school's high-risk coastal location along the northern coast of Java, an area vulnerable to tsunamis. This alarming trend underscored a systemic lack of structured disaster education within the curriculum, reinforcing the need for a well-designed and engaging learning medium. The combination of low student achievement, theoretical-only learning approaches, and the school's vulnerable geographic setting made it evident that a Scrapbook-based instructional media was necessary to enhance tsunami disaster literacy in a more interactive, visual, and student-centered manner.

In the design phase, based on the gaps identified, the development of a Scrapbook-based learning package was conceptualized as an innovative solution. Unlike traditional printed materials, the Scrapbook integrates visual storytelling, infographics, interactive tasks, and real-world disaster scenarios, making it a multi-sensory learning tool tailored to students' cognitive levels. This phase also involved aligning the instructional design with science education principles, disaster literacy frameworks, and student engagement strategies, ensuring that the Scrapbook not only conveyed information but also stimulated critical thinking and problem-solving related to tsunami preparedness.

In the development phase, the ADDIE model guided the structured creation of Scrapbook-based tsunami mitigation learning materials across four instructional sessions, ensuring a progressive and scaffolded learning experience. The Scrapbook incorporated illustrations, real-life tsunami case studies, simulation activities, and hands-on tasks, aimed at bridging the gap between theoretical learning and practical disaster awareness. To validate its effectiveness, four experts— a science education expert, a language expert, an instructional media specialist, and a disaster mitigation practitioner— conducted a rigorous evaluation of the Scrapbook's content, language clarity, media effectiveness, and alignment with disaster risk reduction principles.

This structured approach ensured that the Scrapbook was

not only scientifically accurate but also pedagogically effective, making it a practical, engaging, and essential tool for tsunami disaster education among junior high school students in coastal disaster-prone areas (Orab et al., 2023; Yamin et al., 2024). After that, validation was carried out by 4 experts and the results were as follows:

[Table 1 about here.]

Based on the validation results conducted by four experts, the Scrapbook instructional media was deemed valid and suitable for implementation in science education at the school level. Validation serves as crucial evidence in determining the accuracy and effectiveness of the developed instructional media in achieving the research objectives. It is also a prerequisite for advancing to the next phase of the study (Pancarani, 2024; Ummah et al., 2024; Wardhani, 2018). The validation process is essential for assessing the credibility and precision of research instruments in relation to the measured variables, ensuring that the research findings are accurate, reliable, and reflective of real-world conditions (Nissa et al., 2021).

To ensure rigor in the validation process, only experts in their respective fields conducted the assessment, bringing both theoretical expertise and practical experience. Their insights and recommendations were instrumental in refining the Scrapbook media, enhancing its pedagogical value, visual appeal, and instructional clarity. Expert validation is not merely a formality; it is a critical process that ensures the developed media is scientifically sound, pedagogically effective, and beneficial to a wider audience (Faresta et al., 2020; Septaria & Rismayanti, 2022). The validation phase also provided specific recommendations for improvement, ensuring that the media was not only valid in content but also engaging and adaptable to different classroom contexts, particularly in disaster-prone coastal regions where disaster literacy is essential (Luh Nyoman Gita Acyuta Dewi et al., 2024; Septaria et al., 2020).

Following validation, the implementation phase was conducted in two stages to assess the practical effectiveness of the Scrapbook in real classroom settings. The first trial involved 15 students, serving as a small-scale pilot study to gather preliminary feedback on usability, engagement, and content clarity. This phase helped identify any necessary adjustments before a full-scale implementation. The second trial involved 65 students, providing a broader dataset to evaluate the Scrapbook's effectiveness in improving tsunami disaster literacy among junior high school students. This structured two-stage implementation was essential to observe learning outcomes, measure student engagement, and analyze improvements in cognitive understanding regarding disaster mitigation.

By integrating expert validation and staged implementation, the study ensured that the Scrapbook instructional media was not only theoretically valid but also practically effective. This approach strengthens its potential as a valuable educational tool for enhancing disaster literacy, particularly in schools situated in tsunami-prone areas, where preparedness can significantly impact student safety and community resilience.

[Table 2 about here.]

The data presented in Table 2 represents the feedback and suggestions provided by both validators and students during the first trial phase. These recommendations are particularly crucial, especially from students, as they are the end users of the developed instructional media. The feedback serves as a key foundation for improvement, ensuring that the Scrapbook media is not only pedagogically sound but also engaging, practical, and effective in enhancing tsunami disaster literacy. Furthermore, obtaining insights directly from students allows researchers to observe real classroom interactions, ensuring that the variables under study exhibit significant changes and improvements in student comprehension and engagement (Nafrianti et al., 2017).

The constructive feedback from validators and students was systematically analyzed and used as the basis for refining and enhancing the Scrapbook instructional media. Specific modifications were made to improve content clarity, visual presentation, instructional design, and interactive elements. These refinements were essential in optimizing student engagement and comprehension, ensuring that the Scrapbook was not just informative but also immersive and relatable. After implementing these improvements, the second trial was conducted with a larger student sample, allowing for a more comprehensive assessment of the media's effectiveness and its impact on disaster literacy.

Following the completion of the first trial, students underwent a literacy assessment using a specially developed instrument to measure the impact of the Scrapbook on their tsunami disaster literacy levels. This literacy test was carefully constructed and validated to ensure that it accurately assessed students' cognitive understanding, critical thinking skills, and practical knowledge regarding disaster preparedness. The validity of the 20-item literacy test was then statistically analyzed to determine the accuracy and reliability of the assessment tool, with the results presented in Table 3.

This validation of the literacy test is a critical step in ensuring that the research instruments are scientifically robust and capable of measuring actual learning gains. The effectiveness of the Scrapbook media is not solely based on

student perceptions, but also on empirical evidence derived from standardized assessments. By employing this systematic approach, the study ensures that the developed Scrapbook instructional media is not only theoretically valid but also empirically proven to enhance tsunami disaster literacy among students, making it a valuable and effective educational tool for disaster mitigation learning.

[Table 3 about here.]

Based on the decision results in Table 3, which were determined by the condition r-calculated > r-table, it was concluded that 100% of the disaster literacy test items were valid. The validity of this test instrument confirms its ability to precisely and accurately measure students' literacy levels related to tsunami disaster preparedness. In educational research, the accuracy of an instrument in measuring the intended variable is crucial to ensure that the findings are reliable, meaningful, and applicable (Muktadir & Wardhani, 2022).

Following the validity test, a reliability test was conducted using Cronbach's Alpha, which resulted in a score of 0.676 > 0.6, indicating that the 20-item test instrument was reliable. Reliability in this context ensures that the test consistently measures students' literacy levels without significant fluctuations or biases. A reliable instrument enhances the credibility of the study, ensuring that repeated assessments yield consistent and dependable results. This step was essential in confirming that the literacy test instrument was not only valid but also statistically stable and applicable across different student samples.

Following the first trial, refinements were made to the Scrapbook instructional media based on expert feedback and student input. These revisions aimed to enhance clarity, engagement, and instructional effectiveness, ensuring that the Scrapbook was fully optimized for student learning. Subsequently, a second trial was conducted with a larger sample size of 65 students to further evaluate its effectiveness. The increased sample size provided a more comprehensive dataset, allowing for a deeper analysis of the impact of the Scrapbook on tsunami disaster literacy.

After implementing the Scrapbook-based learning intervention in the second trial, students were assessed using pre-test and post-test evaluations. These assessments were essential in measuring the extent of students' knowledge acquisition and literacy improvement following exposure to the Scrapbook media. The results from the pre-test and post-test scores were then used to conduct normality and homogeneity tests, ensuring that the data met statistical assumptions before further inferential analysis. These results, presented in Table 4, provide critical insights into the effectiveness of the Scrapbook instructional media and its impact on improving students' disaster literacy.

By employing a structured and rigorous validation, reliability testing, and experimental trial approach, this study ensures that the Scrapbook instructional media is not only conceptually valid but also empirically proven. The sequential trial-and-improvement process guarantees that the developed media is optimized for real-world classroom application, ultimately contributing to a more effective and engaging disaster education curriculum for students in coastal, tsunami-prone regions.

[Table 4 about here.]

Based on the normality test results presented in Table 4, the significance values for both the first and second trial classes were found to be greater than 0.05, indicating that the data were normally distributed. Establishing normality is a crucial prerequisite for conducting parametric statistical analyses, as it ensures that the dataset follows a Gaussian distribution, which is essential for deriving valid and generalizable conclusions about the effectiveness of the Scrapbook instructional media in enhancing tsunami disaster literacy.

Following the normality test, the researcher proceeded with a homogeneity test to determine whether the literacy test results among the trial groups demonstrated consistent variance across different student samples. Homogeneity testing is fundamental in experimental research, as it verifies that the variability in student responses is statistically uniform, allowing for meaningful comparisons between groups. If the assumption of homogeneity is met, the researcher can confidently attribute differences in post-test scores to the effectiveness of the Scrapbook media rather than to random variations in the sample characteristics.

By ensuring both normality and homogeneity, this study establishes a strong statistical foundation for further inferential analysis, such as paired sample t-test, to measure the impact of the Scrapbook intervention. These rigorous statistical checks enhance the credibility and reliability of the research findings, ensuring that the Scrapbook instructional media is not only engaging but also demonstrably effective in improving students' tsunami disaster preparedness. The results of the homogeneity test, which further validate the integrity of the dataset, are presented in Table 5.

[Table 5 about here.]

Based on the homogeneity test results conducted on the trial subjects, the significance value obtained from the Mean-Based Test was 0.273 > 0.05, indicating that the dataset was homogeneous. This finding confirms that the variance of the

data across different student groups was statistically uniform, meaning that any observed differences in literacy outcomes were likely due to the intervention rather than inherent variability among the students. With the homogeneity assumption met, the data analysis could proceed with parametric empirical testing, ensuring that further statistical inferences would be both valid and reliable.

Following the confirmation of data normality and homogeneity, the researcher conducted a Paired Sample T-Test to examine the impact of the Scrapbook instructional media on students' disaster literacy levels before and after the learning intervention. This test is particularly powerful in detecting significant differences within the same group over time, making it an ideal method for evaluating whether the Scrapbook media effectively enhanced students' understanding of tsunami disaster mitigation.

The Paired Sample T-Test not only measures mean differences but also provides insights into the magnitude of learning improvement, indicating whether the changes in disaster literacy were statistically significant or occurred by chance. By comparing pre-test and post-test scores, this analysis determines whether the Scrapbook-based learning approach resulted in meaningful cognitive gains and improved disaster preparedness skills among students.

Conducting this rigorous empirical test strengthens the scientific credibility of the research, ensuring that the Scrapbook instructional media is not only conceptually valid but also empirically effective in improving students' tsunami disaster literacy. The results of the Paired Sample T-Test provide crucial evidence on the educational impact of incorporating interactive and visually engaging media in disaster preparedness education, further reinforcing the necessity of innovative learning approaches in schools situated in tsunami-prone coastal regions.

[Table 6 about here.]

The Significance Value (2-tailed) < 0.05 indicates a statistically significant difference between the initial and final variables. This finding confirms that there was a meaningful impact resulting from the treatment applied to the respective variables. Based on the data analysis outlined above, the literacy test instrument was validated, demonstrating that it accurately measures students' knowledge and understanding of tsunami disasters. This validation is crucial, as it ensures that the instrument effectively assesses students' disaster literacy, providing them with a structured learning framework that enhances their ability to grasp and retain new knowledge.

From the statistical data analysis, it is evident that the use of Scrapbook instructional media significantly improved students' disaster literacy at SMP Al-Amin. The increase in

tsunami disaster literacy among students serves as an essential preparedness tool, equipping them with the necessary knowledge and skills to respond effectively in the event of a disaster. Having disaster literacy helps students remain calm, take appropriate initial actions, and increase their chances of survival in real-life emergency situations (Anisah & Sumarni, 2019; Septaria, 2023). The importance of disaster literacy extends beyond SMP Al-Amin, particularly for students living in coastal regions where tsunami risks—though sometimes minimal—can still pose significant threats. Tsunami events do not necessarily originate near the shore; they can also be triggered by distant seismic activities, as evidenced by the 2004 Indian Ocean tsunami, which impacted regions as far as India, South America, and Australia, despite originating in Aceh, Indonesia (Prasetyo et al., 2021; Rahiem & Widiastuti, 2020; Zahara, 2019).

A well-informed individual with disaster literacy can at least save their own life and potentially help others by educating their peers and community members (Chotijah Fanaqi, 2021; Syah, 2020). Unfortunately, disaster mitigation education remains scarce, largely due to limited awareness, inadequate disaster literacy levels, and a lack of accessible educational media (Puspaningrum, 2022; Septaria et al., 2020). Many studies have primarily focused on cognitive understanding rather than providing practical, interactive learning tools that facilitate disaster preparedness. This gap highlights the urgent need for the development of engaging disaster education materials, such as Scrapbook instructional media, which offers an interactive and student-centered learning approach (Manurung & Tafonao, 2021; Pahleviannur, 2019).

By integrating visually engaging content, real-world disaster scenarios, and hands-on activities, the Scrapbook instructional media addresses these gaps in disaster education. Unlike traditional lecture-based teaching, which often results in passive learning, the Scrapbook fosters active engagement, ensuring that students do not merely acquire theoretical knowledge but also develop critical thinking and problem-solving skills essential for real-life disaster preparedness. The findings of this study reinforce the importance of disaster education through innovative media, particularly in high-risk areas, to create a resilient generation capable of responding effectively to natural disasters.

CONCLUSION

The use of Scrapbook instructional media has proven effective in enhancing students' literacy on tsunami disasters. This is supported by its significant impact on students' reading interest, as demonstrated by statistical analysis. The Scrapbook's visual appeal and interactive design create a strong learning attraction,

increasing student engagement and fostering curiosity about tsunami disasters. This heightened curiosity encourages students to explore and deepen their knowledge, leading to improved literacy skills and a greater understanding of tsunami disasters. By stimulating students' interest and engagement, the Scrapbook serves as an effective educational tool that not only enhances disaster literacy but also develops critical thinking skills essential for disaster preparedness.

ACKOWLEDGMENTS

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TABLE 1 / Scrapbook Device and Media Validation Results by Experts

	Validation Results Percentage (%)	Criteria
Material	80	Valid
Media	81	Valid
Language	85	Valid
Practitioner (Disaster Counselor)	88	Very Valid
Average	84	Valid

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TABLE 2 / Suggestions Received from Validators and Students
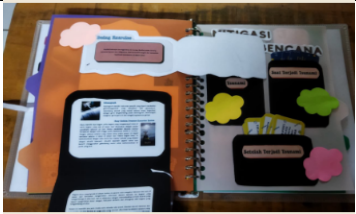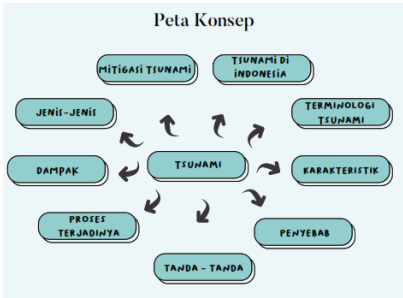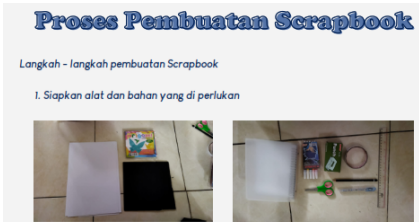
No	Suggestion for improvement	Result of improvement	Image
1	The content of the material in the Scrapbook should have attractive colors to increase students' interest in reading	Improved by adding various colored paper	
2	Need to add learning outcomes to the module for students to understand	Learning outcomes have been added to the module	
3	Need to add a tsunami disaster mitigation concept map to the module	Concept map has been added to the module	
4	The binder size is too small, so the information content contained is too little	The size of the Scrapbook media which was originally P (14.8 cm) and L (10.5 cm) was changed to P (29.7 cm) and L (21 cm) so that it is bigger.	
5	Need to add guidelines for the use and creation of media for students to try to make independently	Guidelines for the use and creation of Scrapbook media have been added	
6	Need to add evaluation integrated into Scrapbook media	Evaluation adapted to Scrapbook media has been added	

TABLE 3 / Validation Results of Student Literacy Question Items

No. Instrument Item	Person Correlation R Calculation	R Table	Significant Value	Criteria
1	0,623	0.444	0.05	Valid
2	0,534	0.444	0.05	Valid
3	0,614	0.444	0.05	Valid
4	0,598	0.444	0.05	Valid
5	0,611	0.444	0.05	Valid
6	0,601	0.444	0.05	Valid
7	0,690	0.444	0.05	Valid
8	0,522	0.444	0.05	Valid
9	0,571	0.444	0.05	Valid
10	0,604	0.444	0.05	Valid
11	0,544	0.444	0.05	Valid
12	0,528	0.444	0.05	Valid
13	0,519	0.444	0.05	Valid
14	0,609	0.444	0.05	Valid
15	0,591	0.444	0.05	Valid
16	0.510	0.444	0.05	Valid
17	0.464	0.444	0.05	Valid
18	0.624	0.444	0.05	Valid
19	0.636	0.444	0.05	Valid
20	0.455	0.444	0.05	Valid

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TABLE 4 / Results of the Normality Test of the Research Trial Samples

Tsunami Literacy	**Kolomogrov Smirnov**			**Shapiro Wilk**		
	Statistic	df	Sig	Statistic	df	sig
Pre-test (Trial 1)	.338	15	.113	.881	15	.209
Post-test (Trial 2)	.232	15	.059	.930	15	.075
Pre-test (Trial 1)	.185	65	.204	.863	65	.123
Post-test (Trial 2)	.167	65	.235	.963	65	.231

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TABLE 5 / Results of Homogeneity Test of Trial Research Samples

		Levene Statistic	df1	df2	Sig.
Student Literacy Results	Based on Mean	1.228	1	65	.273
	Based on Median	.887	1	65	.359
	Based on Median and with adjusted df	.874	1	44.565	.360
	Based on trimmed mean	1.177	1	64	.284

TABLE 6 / Paired Sample Test Results

		Paired Differences								
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Pre Test - Post Test	-17.96000	7.14423	1.42885	-20.90899	-15.01101	-12.474	64	.000

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Analysis	Design	Development
1. Identified low tsunami disaster literacy 2. Disaster education lacks interactive and engaging media. 3. Scrapbook chosen for its visual appeal & hands-on learning. 4. Curriculum lacks structured disaster mitigation content.	1. Developed interactive scrapbook with infographics & real-life scenarios. 2. Created pre-test & post-test to measure literacy improvements. 3. Validation by experts in content, media, and disaster mitigation.	1. Designed high-quality visuals & engaging narratives. 2. Expert validation (84%) led to size adjustments & added concept maps. 3. Integrated hands-on activities for active learning.

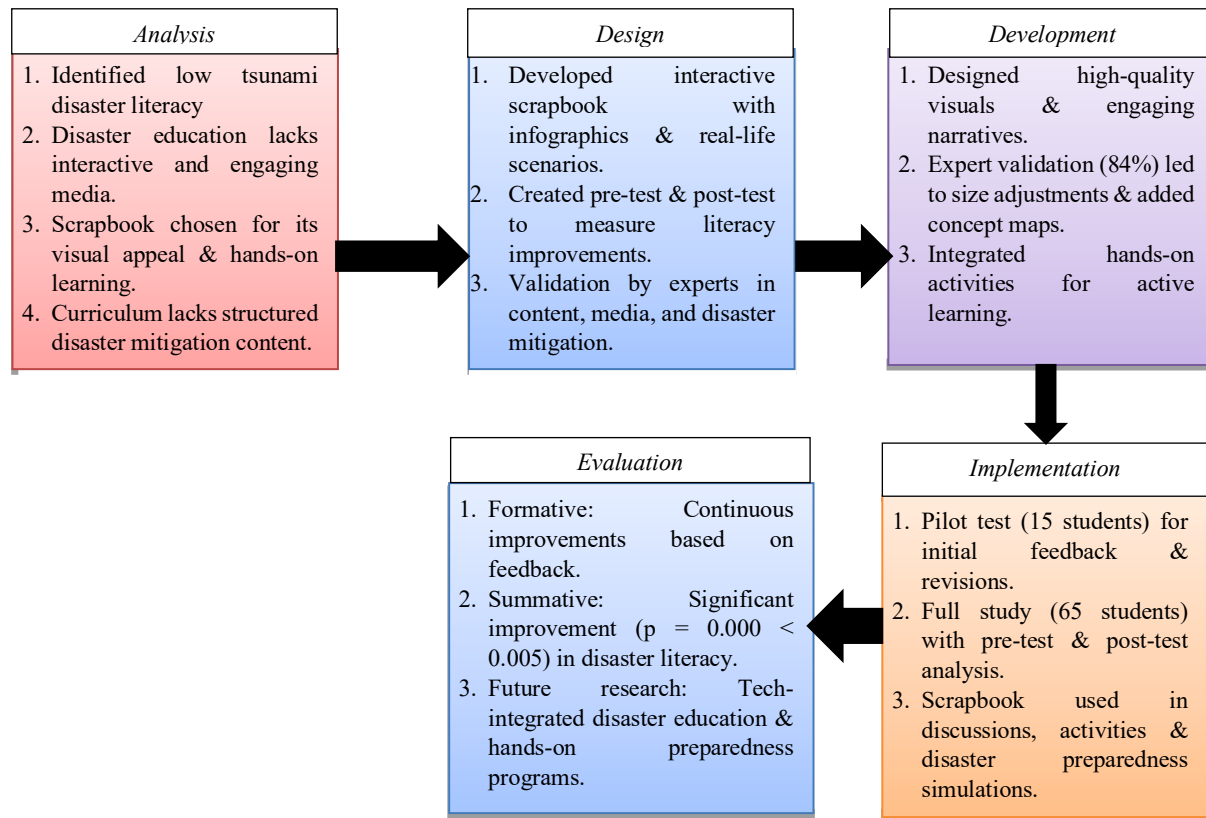| Evaluation	Implementation
1. Formative: Continuous improvements based on feedback. 2. Summative: Significant improvement (p = 0.000 < 0.005) in disaster literacy. 3. Future research: Tech-integrated disaster education & hands-on preparedness programs.	1. Pilot test (15 students) for initial feedback & revisions. 2. Full study (65 students) with pre-test & post-test analysis. 3. Scrapbook used in discussions, activities & disaster preparedness simulations.

FIGURE 1 / ADDIE Model Development Flow