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Strengthening psychological disaster literacy for elementary school students through visual storytelling activities

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ABSTRACT

Psychological disaster literacy is the central pillar of disaster risk reduction, which provides mental strengthening of knowledge, attitudes, and actions for disaster risk reduction to avoid the widespread impact of disasters. As one of the areas that has the potential for a high-risk disaster, Pangandaran has implemented disaster risk reduction efforts in education units through disaster mitigation education activities from an early age in elementary schools, but the survey results show that 67.6 percent of them have never carried out disaster mitigation learning with students' psychological resilience. This study aims to strengthen psychological disaster literacy for elementary school students in Pangandaran through storytelling and visual expression activities. The method used is development research with the ADDIE model. The validation results show feasibility in the range of 0.85 - 0.93 for aspects of contextual assessment, material, and presentation feasibility. These results follow the local wisdom of disaster mitigation in Pangandaran. The development of psychological disaster literacy learning was considered relevant to the needs of elementary school teachers in Pangandaran, who received an assessment in the very good range and in the good range.

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ABSTRAK

Literasi psikologi bencana merupakan pilar utama pengurangan resiko bencana yang memberikan penguatan mental dari aspek pengetahuan, sikap dan tindakan pengurangan resiko bencana agar terhindar dari dampak bencana yang meluas. Sebagai salah satu wilayah yang memiliki potensi bencana dengan resiko tinggi, kabupaten Pangandaran telah mewujudkan upaya pengurangan resiko bencana di satuan pendidikan melalui kegiatan edukasi mitigasi bencana sejak dini di sekolah dasar namun hasil survey menunjukan 67.6 persen diantaranya belum pernah melaksanakan pembelajaran mitigasi bencana bermuatan ketahanan psikologis siswa. Penelitian ini bertujuan melakukan penguatan literasi psikologi bencana bagi siswa sekolah dasar di kabupaten Pangandaran melalui kegiatan ekspresi visual storytelling. Metode yang digunakan adalah penelitian pengembangan dengan model ADDIE. Hasil validasi menunjukan kelayakan pada rentang 0,85 - 0,93 untuk aspek penilaian kontekstual, materi dan kelayakan penyajian. Hasil tersebut dipandang sesuai dengan kearifan lokal mitigasi bencana di kabupaten Pangandaran. Pengembangan pembelajaran psikologi bencana ini dinilai relevan dengan kebutuhan guru sekolah dasar di kabupaten Pangandaran dan mendapatkan penilaian pada rentang sangat baik dan baik.

Kata Kunci: *Pembelajaran; literasi psikologi bencana; storytelling; ekspresi visual*

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INTRODUCTION

A disaster is an event that causes widespread damage and distress. So, the focus of disaster management is no longer post-disaster management but prevention and how people prepare to face disasters. This awareness shows that disaster literacy is the key to a country's disaster management success. Literature studies investigating the level of community disaster literacy discuss various aspects (Genc et al., 2022), such as disaster information literacy, disaster prevention literacy, disaster risk literacy, disaster risk reduction literacy, and disaster management literacy. Disaster literacy is an individual's ability to access, read, understand, and use the information necessary to make decisions and follow instructions regarding mitigation, preparation, response, and recovery during a disaster. Disaster literacy levels have also been studied in several countries, such as China, Indonesia, Nigeria, and the Netherlands. Another study aims to determine the level of disaster prevention literacy in schools, where among the three dimensions of disaster mitigation literacy (knowledge, attitudes, and skills), individuals know the most about skills and the least about knowledge (Chung & Yen, 2016). It is hoped that these three dimensions of literacy will become a strategy to foster psychological resilience from an early age. Low cognitive, educational, and literacy factors negatively impact safety during and after a disaster (Brown et al., 2014). The results of the UNESCO study show that the risk level is higher because most people in disaster-prone areas have a low knowledge of disaster risk reduction (Adiyoso & Kanegae, 2013; Kohn et al., 2012).

Some researchers describe resilience as the 'ability to recover', which represents an individual's tendency to maintain his or her internal balance despite experiencing traumatic events or stressful conditions. In addition, resilience capacity indicates the ability to face traumatic events positively and reorganize in the face of adversity. The interaction of innate personality factors, personal goals, and external and psychosocial contexts can influence functional adaptation to challenging conditions. Several factors that enable the implementation of resilience behavior can be identified: cognitive flexibility, positive affect and optimism, humor, acceptance, active coping, religion or spirituality, altruism, social support, role models, exercise, capacity to recover from negative events, and stress inoculation. Thus, what determines resilience is a personal quality that is identified as the main factor even when stressful or traumatic events occur (Sisto et al., 2019). As one of the vulnerable groups, children may be physically injured and suffer due to disasters, potential malnutrition caused by food supply disruptions or mental health problems, grief of losing loved ones, care with parents or caretakers who experience stress, so that it can interfere with children's education because of demands to meet primary needs in challenging times (Kousky, 2016). Therefore, children need education from an early age regarding knowledge and attitudes when facing disasters, even to achieve efforts to prevent disasters (Seddighi et al., 2022; Suryadi et al., 2021).

Previous studies have emphasized the importance of disaster literacy as a crucial element in enhancing preparedness and resilience, especially among vulnerable populations like children. Based on previous research, storytelling has been proven effective in developing resilience in early childhood when facing earthquakes (Dewi, 2024). This research focused explicitly on earthquake resilience and was implemented for early childhood students. Therefore, there is a need to conduct further research to develop a broader framework that can be applied to various types of natural disasters and provide comprehensive disaster education for children that includes knowledge acquisition and psychological resilience across different disaster scenarios.

This research aims to develop disaster psychology literacy learning for elementary school students through visual storytelling expression activities because the information format for disaster risk reduction can be accessed and understood by children through an appropriate approach. Children's cognitive activities that center on visual information can provide a better understanding of representing meaning (Yu, 2009), and visual storytelling is often described as a more exciting approach for children (Roth, 2021). Through this

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activity, it is hoped that children can achieve a high level of meaning regarding disaster mitigation, have good psychological resilience, and recover from post-disaster conditions.

LITERATURE REVIEW

Psychological literacy is a teaching approach that encourages educators to develop students' personal, social, and cultural awareness while supporting them to take responsibility for themselves through problem-solving skills (Rahmatullah et al., 2022). Only a few modules or programs intentionally center psychological literacy as a pedagogical approach in development, design, and content (Harris et al., 2024). This study supports disaster risk reduction and resilience education, one of the pillars of disaster safety education in Indonesia, through the development of a psychological disaster literacy construct that is a reference for the design of psychological disaster literacy learning through visual storytelling activities.

Psychological Literacy and Disaster Connection in Pedagogical Design

Human health and well-being are inseparable concepts (Rabinowitz et al., 2018); human well-being can synergize with nature in psychology, but studying human relationships with nature is challenging (Clayton & Brook, 2005). The application of psychological knowledge to improve human-nature relationships is essential for students. However, limited psychology curricula have engaged deeply with issues of human relationships with nature (Pearson, 2013). This paper will outline the development of a learning experience designed to help students develop psychological literacy to improve human well-being, especially in the face of natural disasters.

Disaster literacy includes knowledge, attitudes, and behaviors regarding natural disasters. The knowledge dimension is the basic level, including the knowledge we encounter daily. Internalization refers to attitudes and the transformation of knowledge that is internalized and adopted into behavior at an advanced level (Ting, 2023). Disaster literacy is part of the outcome of non-structural disaster mitigation efforts such as education, training, and information technology that support disaster preparedness (Brown et al., 2014). The disaster literacy model developed will be a reference in this study.

In this model, predisposing factors, including education, can influence disaster literacy. There is a need for an integrated psychological literacy approach in the education curriculum. Starting with aligning perceptions about how psychological literacy in disasters is viewed, including. Starting with aligning perceptions of how psychological literacy in the disaster is viewed, including the values and expected learning outcomes. Ideally, to successfully embed a psychological literacy approach into the curriculum, psychological literacy must be included in program outcomes, curriculum content, and assessments, all of which must be aligned constructively (Biggs, 1996; Pownall et al., 2023). This allows psychological literacy to become a competency.

Visual Storytelling

The format of disaster risk reduction information can be accessed and understood by children through an appropriate approach. Children's cognitive activities centered on visual information can provide a better understanding of representing meaning (Ramli & Musa, 2020; Yu, 2009), and visual storytelling is often described as a more engaging approach for children (Roth, 2021). Through this activity, it is hoped that children can achieve a high level of meaning related to disaster mitigation, have good psychological resilience, and recover from post-disaster conditions. Disaster mitigation education refers to the conceptual model of "disaster risk-reduction literacy," which includes the following factors: Proper awareness of potential disasters will foster a sense of preparedness (Kanbara et al., 2016). Individuals

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are aware of their role during a disaster. Knowledge of using available resources and actions to avoid danger. For example, recognizing dangerous places in their environment, evacuation locations, and evacuation methods. Techniques related to health, both physical and mental. Thus, disaster literacy in this study allows individuals to take action to ensure safety and appropriate health actions. In addition, the concept of disaster mitigation literacy development to be developed includes the following four aspects (Baytiyeh & Naja, 2015; Chung & Yen, 2016; Kanbara et al., 2016): (1) antecedents, (2) dimensions of knowledge; types of knowledge (prediction, preparedness, impact, response) and techniques for acquiring knowledge, (3) attitudes (prevention awareness, prevention values, prevention responsibilities), and (4) skills (preparedness actions, behavioral responses).

METHODS

This research is development research using the ADDIE model. The research was designed in the following stages: 1) Analysis of disaster psychology literacy learning needs; 2) Designing a disaster psychology literacy learning construct; 3) Development of learning tools that include media, modules, and worksheets; 4) Implementation of learning through simulations by model teachers and observations by expert teachers; 5) evaluation through a feasibility assessment by an expert teacher.

The participants in this research included grade VI elementary school students, model teachers, and elementary school teachers in Pangandaran Regency. The instruments used include observation sheets and feasibility test questionnaires adapted from BNSP. The data collection stage is carried out at the implementation and evaluation stage of the learning simulation. In order to determine the relevance of the components and tools prepared in disaster psychology literacy learning, a review was carried out by nine expert teachers who have implemented disaster mitigation learning in schools. The review is aimed at assessing the relevance of the material, contextual assessment, and appropriateness of presentation. The assessment results were analyzed by calculating the content validity coefficient using Aiken's Content Validity Index formula (Aiken, 1985).

RESULTS AND DISCUSSION

Literacy has developed into a more functional description of activities. This research aims to produce a formulation of psychological disaster literacy, which involves the dimensions of knowledge, attitudes, and behavior related to disasters, especially natural disasters (Hulme et al., 2015; McGovern et al., 2024; Türker & Sözcü, 2021). Psychological literacy includes the skills and knowledge needed to think critically, solve problems, and apply psychological knowledge in everyday life. Psychological literacy is "applying psychological science to understand social and personal needs" or using psychological content to "understand the world around us" (Harris et al., 2021).

Psychological literacy is closely related to mental health literacy, including knowledge, attitudes, and help-seeking behavior (Clough et al., 2019). The following is an analysis of the Psychological Disaster Literacy concept carried out on 34 elementary school teachers through a written questionnaire, with 3 of them giving answers unrelated to the concept and one person giving no response. The results of data reduction for the concept of psychological disaster literacy can be seen as follows:

1. Concept 1
   Awareness/Understanding/emergency response attitude regarding disaster management
2. Concept 2
   Physical and mental preparedness to face disasters/both before/during a disaster/after a disaster

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3. Concept 3
   Individual awareness or understanding of their ability to mitigate/overcome disasters and adapt to the psychological impacts that arise as a result of disasters and interventions to recover from them

The researcher concludes that psychological disaster literacy is interpreted as awareness/understanding of disaster management and attitude towards self-rescue in emergencies and the ability to adapt to the psychological impacts that arise before/during a disaster/post-disaster, as well as interventions to recover from it. This concept is a topic of disaster mitigation that has not been widely discussed. Based on survey results at elementary schools in Pangandaran Regency, 67.6% have never carried out disaster mitigation learning at school, 5.9% carried out disaster mitigation learning activities but did not contain students' psychological resilience, and 26.5% have carried out disaster mitigation learning activities that include psychological resilience, with varied approaches, including integrated learning (20.6%), extracurricular activities (14.7%) and incidental activities involving the Regional Disaster Management Agency (29.4%).

As for the conditions that describe elementary schools in Pangandaran Regency, 17.6% of schools have disaster-safe facilities, 11.8% have school disaster management and disaster mitigation education that take place from time to time, 26.5% of schools actively carry out disaster risk reduction activities, and 5.9% of schools are inclusive in carrying out disaster preparedness (for example: having risk management for people with disabilities).

The Psychological Disaster Literacy construct.

An effective approach to teaching science about natural disasters and disaster risk reduction emphasizes building connectedness and behavioral actions toward resilience and sustainability (Canlas & Karpudewan, 2023). This framework combines cognitive knowledge, skills, and dispositions, adding related connections and actions. In addition to promoting sustainable resilience in the face of disasters, it also teaches taking responsibility for behavioral actions. The following is a construct of Psychological Disaster Literacy in children adapted from the five elements of trauma intervention according to (Hobfoll et al., 2007). **Table 1** shows the psychological disaster literacy construct.

Table 1. Psychological Disaster Literacy Construct

No.	Dimensions	Indicator
1	**Building a sense of psychological security**	
	Pre Disaster	Know evacuation routes or understand the alternative search for shelter
		Prepare items needed in the event of a disaster
		Understand early warning systems
		Be aware of the potential for disaster in the surrounding area
		Know the predictive signs of impending disaster
	Disaster Emergency Response	Prioritize immediate physical security or self-protection initiatives
		Participate in fun activities during the emergency response phase
		Understand short-term plans set by relatives/parents
		Filter media and social network information
	Post Disaster	Build physical closeness with parents or relatives
		Re-establish regular routines or activities

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No.	Dimensions	Indicator
2	**Cultivate inner peace**	
	Pre Disaster	Know basic relaxation strategies, such as controlled breathing, muscle relaxation, and positive imagery exercises.
	Disaster Emergency Response	Participate in calming activities and recognize and acknowledge that various physiological and emotional reactions related to disasters and trauma should be viewed as normal reactions to abnormal events.
	Post Disaster	Know cognitive and emotional coping skills according to personal needs
3	**Self Efficacy**	
	Pre Disaster	Have an emergency disaster response plan, roles, and responsibilities in rescue when a disaster occurs
		Providing disaster mitigation knowledge or information from various media
	Disaster Emergency Response	Manage thoughts, emotions, and actions with the help of adults
	Post Disaster	Be aware and interpret positively all events
		Accept the role of social support
		Finding disaster competencies
4	**Connectedness**	
	Pre Disaster	Participate collaboratively in disaster management (disaster response recovery)
	Disaster Emergency Response	Know the service hotline
	Post Disaster	Building a spirit of volunteering
5	**Hope/ Harapan**	
	Pre Disaster	Ensure a sense of security in a disaster (or other emergency), have a realistic and specific safety plan
	Disaster Emergency Response	Validating the concept of mukjizat/ God's gift of salvation and regenerating hope in life
	Post Disaster	Instill hope in resuming normal activities and shift their focus away from feelings of depression and thoughts of hopelessness

Source: Research 2023

Design of Visual Storytelling Learning Activities

The visual storytelling activities begin with the preparation of a narrative with a linear three-act spatial narrative approach (Roth, 2021), which is developed from the psychological disaster literacy learning indicators that will be used in the story in the following order:

1. Set up
   The indicator at this stage is being aware of the potential for disasters in the surrounding area. This is linked to disaster problems in the Pangandaran Regency, namely the coast, where individuals must be aware of the potential for coastal disasters.
2. Problem
   At this stage, individuals are expected to be able to recognize problems, one of which is knowing the predicted signs of an impending disaster. For example, individuals are expected to recognize the signs

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of an impending tsunami, such as receding sea levels, the sound of roaring waves, animal behavior heading to higher ground, etc. Then, individuals are expected to be able to prepare the items needed when a disaster occurs, such as understanding the contents of a disaster preparedness bag.

3. Conflict
   At this stage, individuals are expected to be able to recognize actions/actions along with increasing tension, including knowing evacuation routes or understanding alternatives for finding shelter, understanding short-term plans set by relatives/parents, prioritizing physical safety immediately or self-protection initiatives, understanding early warning systems, managing thoughts, emotions and actions with the help of adults, building physical closeness with parents or relatives, participating in calming activities, recognizing and acknowledging that various physiological and emotional reactions related to trauma disasters should be viewed as normal reactions to abnormal events.
4. Resolution
   At this stage, it begins with a climax, where individuals are directed to enrich their understanding of how to solve a problem. Among them are providing knowledge or information on disaster mitigation from various media, validating the miracle of safety and rekindling hope for life, rebuilding routines or regular activities, participating in fun activities during the emergency response phase, knowing cognitive and emotional coping skills according to personal needs, instilling hope to continue normal activities and diverting their focus from feelings of stress and thoughts of despair, finding disaster competency, believing in the sense of security in a disaster (or other emergencies), having a realistic and specific safety plan, having an emergency disaster response plan, understanding the roles and responsibilities in rescue during a disaster, knowing the hotline service, being aware of and positively interpreting all events, participating collaboratively in disaster management (disaster response & recovery), and building a Volunteering spirit.

Evaluation of PDL Learning

Evaluation is carried out to determine the quality of learning resources and how learning indicators can be achieved. Evaluation is carried out by testing the suitability or relevance of the content through rational analysis by educational psychologists, linguists, fine arts and design experts, and expert teachers in elementary schools (Lestari, 2023). Data analysis uses Aiken's V formula (Aiken, 1980) to calculate the content-validity coefficient based on the assessment results from a panel of 9 experts. The formula proposed by Aiken is as follows in **Figure 1**.

$$V = \sum S/[n(c-1)]$$

s = r - lo
r = number given by the assessor
lo = lowest validity assessment number
n = number of assesors
c = highest validity assessment number

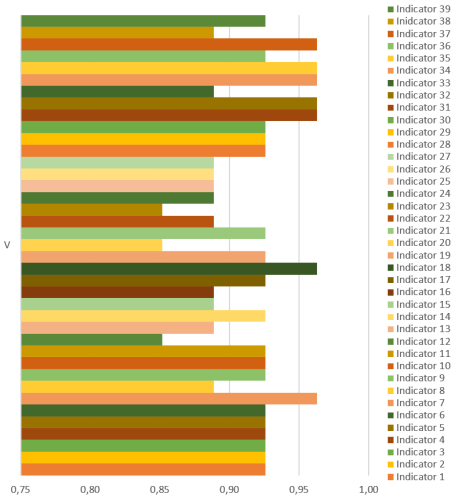

Figure 1. Content Validity of PDL Learning
Source: Azwar in the book titled "Reliabiltas dan Validitas"

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The Aiken's V coefficient value ranges from 0 - 1. The psychological disaster literacy learning feasibility test results obtained a coefficient in the range of 0.85 - 0.96. This means it has adequate content validity. Meanwhile, learning objectives are evaluated through students filling in worksheets after learning (Amartyah & Rusmini, 2022). In this research, the evaluation measured students' learning outcomes related to psychological disaster literacy. Based on the results of data reduction on student worksheets, three categories of student answers were obtained, which led to the achievement of behavioral dimensions that fostered calm and adjustment after a disaster, such as taking a deep breath, being patient, do not panic, say positive words, do activities you like to avoid stress and accept what happened.

The dimension of connectedness then includes the willingness to provide help, building a volunteering spirit by helping and comforting friends who are having difficulties, and finally, increasing hope for life to return to normal activities after a disaster occurs.

Discussion

Psychological literacy learning is a pedagogical approach that encourages applying psychological knowledge in solving problems (Harris et al., 2024). In the context of learning, psychological literacy can be developed through learning by practicing (Horn et al., 2021). The selection of grade 6 students was based on considering decoding skills as the basis for early identification of literacy skills in elementary school students with greater discriminatory power in the final years of elementary school when students are more fluent in reading (Morlini et al., 2015). Learning Activities are divided into three parts, namely Introduction, Core, and Closing. The first is the introduction. In the preliminary activities, educators must prepare students psychologically and physically for the learning process by asking how they are and how they are feeling, linking questions to the learning topics that will be presented, and not forgetting to introduce themselves.

Teachers are also expected to provide contextual learning motivation according to the material's benefits and applications in everyday life. Teachers can ask questions about previous knowledge and the material to be studied (Apperception). The teacher explains the learning objectives or basic competencies to be achieved, the scope of the material, and the description of the activities to be studied. The second is the Core Activity, in which there are Five Phases or levels of Learning with the PBL Method (Etherington, 2011).

1. Phase 1: Orientation of students to the problem
   The teacher can tell a problem through Storytelling Pictures, as shown in the picture on the side. The story of Marlin, a 12-year-old boy who lives near the beach. Educators can describe the situation in the story and raise a conflict. Storytelling Pictures are not presented directly from beginning to end. In this phase, the teacher stops at the emergence of the first conflict, which is the beginning of the topic that will be discussed in depth. The conflict in the Storytelling Picture is an earthquake that makes Marlin panic and worry, especially with the conditions around him that are damaged by the earthquake. So, Marlin and his mother must stay overnight in a refugee camp. Students are then given questions related to the Storytelling Picture conflict. For example, "If you were Marlin, what would you do?"
2. Phase 2: Organizing students to learn
   a. In this phase, the teacher divides students into five groups with members adjusted to the number of students.
   b. Each student representative from each group takes the worksheet.

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3. Phase 3: Guiding individual and group investigations
   a. Students and teachers read the worksheet together.
   b. Students work on the worksheet under the teacher's supervision. The teacher goes around, approaching each group to ask questions related to the questions given, but does not direct students to answer questions according to the answers that have been prepared.
   c. Students are also given time to watch videos and observe teaching materials to complete the questions on the worksheet.
4. Phase 4: Developing and presenting work results
   Each group puts forward answers to each question in the worksheet.
5. Phase 5: Analyzing and evaluating the problem-solving process
   a. Students listen to storytelling about Storytelling Pictures delivered by the teacher.
   b. Students work on evaluation questions. After that, it is collected and assessed by the teacher.

Closing is the third activity in the core component. In this activity, students convey the benefits of learning, which is a reflection. Whether students understand the steps for disaster mitigation containing psychological resilience or not, the teacher can ask in this activity. Furthermore, the teacher provides feedback to students regarding the process and results of student work in the form of an individual post-test. Teachers can provide further learning so that students can actively learn disaster mitigation to foster psychological resilience literacy, which includes strong knowledge of disasters, the capacity to flexibly apply knowledge to new situations, and self-awareness and critical reflection in understanding the mental processes and behavior of oneself and others (Pearson et al., 2024).

By presenting real-life situations in psychological literacy learning through the PBL method to sixth-grade students, students' abilities to recognize emotions, understand other people's perspectives and solve social problems increased significantly. The achievement of learning disaster mitigation material by implementing problem-based learning (PBL) strategies is highest in visual learning styles compared to auditory and kinesthetic (Prasetya et al., 2024). Strong visual and narrative elements facilitate student understanding, especially in the context of drama-based learning (Zhang, 2024). Learning achievement regarding disaster mitigation will be optimal through the right strategy.

This finding has broad implications for the world of education, especially in efforts to develop students with comprehensive life skills. For teachers, the results of this study can provide alternative examples of problem-based learning using visual media and storytelling images based on psychological literacy, thus being able to foster student resilience. Meanwhile, for students, learning psychological literacy can be a valuable asset for facing social challenges in the future. Further research is needed to test the effectiveness of the PBL method in different age groups and diverse cultural contexts and to measure the long-term impact of psychological literacy learning on students' social-emotional development.

CONCLUSION

Literacy has developed into a more functional activity. Low levels of education and literacy are factors that have a negative impact on safety during and after a disaster. This study aims to develop disaster psychology literacy learning for elementary school students through visual storytelling expression activities. Disaster psychological literacy is interpreted as awareness/understanding of disaster management and self-rescue attitudes in emergencies and the ability to adapt to psychological impacts that arise both before/during a disaster/after a disaster and recovery interventions. This construct is a disaster mitigation learning framework based on a visual storytelling approach with a problem-based learning model that is seen as one of the right strategies for teaching natural disasters and disaster risk reduction to children so that it can foster a sense of responsibility for their behavioral actions. The disaster

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psychological literacy learning feasibility test results obtained a coefficient in the range of 0.85 - 0.96. This means that it has adequate content validity. In this study, the evaluation carried out was to measure student learning achievements related to disaster psychological literacy.

Based on the results of data reduction on student worksheets, three categories of student answers were obtained, which resulted in the achievement of behavioral dimensions that foster calm and adjustment after a disaster, such as taking a deep breath, being patient, not panicking, saying positive words, doing activities that children enjoy to avoid stress, and accepting what happens. Then there is the connectivity component, which involves the willingness to help and build a spirit of volunteerism by helping and calming those in need and increasing hope that life will return to normal after a disaster. These findings have important implications for elementary school education that need to underline the need to stimulate children's psychological disaster literacy through storytelling activities in the curriculum. This study provides new and valuable insights but still has limitations. This study was only adapted for elementary school students in upper grades. In addition, there is no evaluation of the long-term impact of storytelling activities in promoting psychological disaster literacy.

AUTHOR'S NOTE

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