

DEVELOPMENT OF PUZZLE GAME MEDIA AS A POST-DISASTER TRAUMA RECOVERY TOOL FOR STUDENTS

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ABSTRACT

Natural disasters not only cause physical damage but also generate psychological trauma among students, disrupting their learning process, social interaction, and emotional development. This study developed puzzle game media as a means of post-disaster trauma recovery for students through guidance and counseling services, using the Research and Development (R&D) method with the 4D model (Define, Design, Develop, and Disseminate). The subjects consisted of one material expert, one media expert, one guidance and counseling (BK) teacher, and nine students of class X-1 at SMA Swasta Dwi Tunggal, with data collected through expert validation sheets and user-response questionnaires and analyzed descriptively. The puzzle game media achieved highly valid scores from the media expert (90%) and material expert (88.3%), and highly practical scores from the BK teacher (88%) and students (88.8%). These findings indicate that the puzzle game media is feasible as an alternative medium in guidance and counseling services, offering BK teachers a low-cost, easy-to-implement tool for supporting students' post-disaster trauma recovery and providing a foundation for developing similar psychosocial interventions in other disaster-affected school settings.

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INTRODUCTION

Natural disasters can trigger trauma, a negative emotional response to distressing events such as accidents, disasters, or other unpleasant experiences. When left unaddressed, the trauma experienced by disaster survivors, particularly children, can generate serious psychological consequences, one indication of which is heightened anxiety (Casman & Mahanani, 2023). Untreated trauma can further disrupt learning, social relationships, motivation, and students' ability to readjust to their educational routine (Alawiyah, 2022). A central problem in the post-disaster recovery of students, however, is the limited use of simple, enjoyable, and developmentally appropriate intervention media within the school setting, as recovery efforts still tend to prioritize physical assistance over the systematic psychological support that could be delivered through school guidance and counseling services.

Children are particularly vulnerable in post-disaster situations because they are still in a formative stage of emotional, cognitive, social, and behavioral development that requires a sense of safety and environmental support. Experiences of loss, damaged housing, disrupted schooling, displacement, and direct exposure to frightening events can trigger anxiety, recurring fear, sleep disturbances, and reduced concentration (Casman & Mahanani, 2023). International evidence corroborates this pattern: a systematic review found that post-traumatic stress symptoms among child disaster survivors can persist over the long term without adequate intervention (Terasaka et al., 2015), while a meta-analysis reported meaningfully elevated depression risk among children exposed to natural disasters compared with their non-

exposed peers (Tang et al., 2014). Recent literature on mental health and psychosocial support (MHPSS) emphasizes that psychosocial support within emergency education settings is essential for helping children continue learning, feel safe, and rebuild their socio-emotional functioning after a crisis (UNICEF, 2024). Natural disasters, particularly earthquakes, floods, and landslides, continue to increase in Indonesia and inflict damage that exceeds the coping capacity of affected communities (Dewi Puspitasari et al., 2024).

A widely recommended approach for addressing childhood trauma is a psychosocial, activity-based intervention that is safe, participatory, and age-appropriate, such as play therapy, since children tend to express their thoughts, emotions, and experiences more readily through play than through direct verbal communication (Ray et al., 2015). A large-scale meta-analysis of 93 controlled outcome studies found play therapy to produce a medium-to-large treatment effect across a wide range of children's psychological and behavioral problems (Bratton et al., 2005). International evidence supports this approach specifically in disaster contexts: a randomized controlled trial found that child-centered play therapy reduced trauma symptoms among refugee children (Schottelkorb et al., 2012), while short-term group play therapy was shown to lower anxiety, depression, and adjustment problems among child survivors of a major earthquake in China (Shen, 2002). School-based psychosocial interventions in humanitarian contexts have also been shown to help restore routines, build a sense of safety, strengthen peer support, and develop students' socio-emotional skills (Lasater et al., 2022), and school-based guidance and counseling has been identified internationally as an appropriate, developmentally sensitive channel for delivering this kind of support to children after natural disasters (Baggerly & Exum, 2008). Among play-based interventions, the puzzle game is considered particularly promising: assembling a puzzle trains concentration, hand-eye coordination, patience, memory, and problem-solving ability (Chasanah, 2022), and in a trauma-recovery context it helps redirect children's attention away from traumatic experiences, builds focus on a structured task, and provides a sense of achievement as the task is progressively completed (Pertiwiwati et al., 2021). Prior studies support the effectiveness of puzzle-based play therapy in reducing trauma symptoms among child disaster survivors, including significant pre-test–post-test PTSD score differences following a play-based trauma-healing program (Pertiwiwati et al., 2021), increased enthusiasm and participation among earthquake-affected students engaged in enjoyable recovery activities (Arianti & Nurkhamidah, 2023), and improved cognitive ability, learning motivation, and active engagement through both conventional and digital puzzle media (Sutriyani et al., 2022).

Although play therapy, trauma healing, and puzzle-based learning have each been studied separately, few studies have examined puzzles as a guidance-and-counseling product; most existing research positions puzzles primarily as a learning medium for improving academic outcomes rather than systematically examining their design, psychopedagogical feasibility, and benefit as a trauma-recovery instrument in schools. Despite increasing evidence supporting play therapy and trauma-healing interventions, little attention has been devoted to developing validated puzzle-based counseling media specifically designed for post-disaster school settings. This study therefore aims to develop puzzle game media as a means of post-disaster trauma recovery for students. The novelty of this study lies in integrating play therapy principles, puzzle-based learning, and school counseling into a structured intervention validated through the 4D development framework — Define, Design, Develop, and Disseminate — with emphasis on needs analysis, media design, expert validation, limited trials, and assessment of the media's feasibility and usefulness (Sugiyono, 2019).

METHOD

This study employed the Research and Development (R&D) method using the 4D development model, consisting of the Define, Design, Develop, and Disseminate stages, originally developed as a framework for systematic instructional product development (Thiagarajan et al., 1974). The 4D model was selected because it offers a systematic procedure for developing educational products, from identifying needs and designing media to product development and dissemination, and is well suited to ensuring that the resulting product aligns with student needs, pedagogical principles, and the intended purpose of the media (Sunzuma & Umbara, 2025).

The subjects of this study consisted of one material expert, one media expert, one guidance and counseling (BK) teacher, and nine students from class X-1 of SMA Swasta Dwi Tunggal. Each subject was involved according to the relevant stage of the 4D model: the material and media experts were involved during the Develop stage to assess the content, presentation, language, and visual quality of the media; the BK teacher acted as an observer assessing the practicality of the media within counseling services; and the students served as participants in a limited trial to provide initial responses to the developed puzzle media. Consistent with the Develop stage of the 4D model, the involvement of nine students should be understood as a limited (preliminary) field test intended to gather initial user responses to the developed media, rather than as a sample intended for statistical generalization to a wider population.

Data were collected through expert validation sheets and user-response questionnaires using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The media expert validation sheet comprised 18 items covering the aspects of visual and graphic design, media durability, and ease of assembly; the material expert validation sheet comprised 12 items covering content accuracy, language clarity, and relevance to the objectives of trauma-recovery counseling; and the practicality questionnaires administered to the BK teacher and to the students each comprised 10 parallel items covering ease of use, engagement, and perceived benefit for post-disaster trauma recovery. Item development followed the general principle of content validity, in which subject-matter experts judge the relevance and adequacy of each item to the construct it is intended to measure (Lawshe, 1975). Data were analyzed using descriptive quantitative techniques, calculating the percentage of validity and practicality with the formula $P = (\text{score obtained} / \text{maximum score}) \times 100\%$. The resulting percentages were then interpreted using the feasibility criteria presented in Table 1, adapted from the validity and practicality criteria commonly used in educational product development research (Nieveen, 1999; Sugiyono, 2019).

Table 1. Feasibility and Practicality Criteria

No	Percentage (%)	Category
1	81 – 100	Highly Valid / Highly Practical
2	61 – 80	Valid / Practical
3	41 – 60	Moderately Valid / Practical
4	21 – 40	Invalid / Impractical
5	0 – 20	Highly Invalid / Impractical

Source: Sugiyono (2019)

RESULT AND DISCUSSION

Result

This study produced a puzzle game media product designed to support guidance and counseling services in facilitating the post-disaster trauma recovery of students. The media was developed through the four systematic stages of the 4D model described below.

Define Stage

Needs analysis was conducted through observation and interviews with the BK teacher at SMA Swasta Dwi Tunggal, which indicated that several students exhibited post-disaster psychological effects, including anxiety, fear, difficulty concentrating, reduced learning motivation, and social withdrawal. A subsequent needs questionnaire distributed to all nine class X students confirmed these findings: most students recognized the importance of managing anxiety and emotional reactions related to the disaster, although some still showed avoidance behavior and reduced confidence in social interaction with peers. Students also expressed a clear need for an interactive, enjoyable medium — most agreed or strongly agreed that a puzzle game would help reduce post-disaster anxiety, would be easy to use in counseling sessions, and would help them express their feelings, while a portion of students also reported ongoing difficulty concentrating after the disaster.

Design Stage

The design stage focused on developing the puzzle media using attractive, brightly colored images divided into pieces to be assembled collaboratively. The activity was designed to encourage cooperation, communication, and mutual assistance among students while training their concentration and thinking skills; during implementation, students were divided into three groups of three, allowing the assembly process to take place collaboratively.

Develop Stage

At this stage, the puzzle media produced according to the design was reviewed by the media and material experts and revised based on their feedback before being tested with students. The media expert recommended reducing the puzzle's cut lines so that the visual appearance would be smoother and would not interfere with the main illustration, while the material expert recommended clarifying the printed text and softening background edits within the accompanying book material for improved legibility. Both revisions were incorporated into the final product.

Table 2. Summary of Validation and Practicality Results

Assessment Aspect	Respondent	Score	Maximum Score	Percentage	Category
Media validity	Media expert	81	90	90%	Highly Valid
Material validity	Material expert	53	60	88.3%	Highly Valid
Practicality	BK teacher	44	50	88%	Highly Practical
Practicality	Students (n = 9)	400	450	88.8%	Highly Practical

Source: Data processed by the researchers (2025)

As shown in Table 2, the puzzle game media achieved a validity score of 90% from the media expert and 88.3% from the material expert, both falling into the "highly valid" category, following minor revisions to the cut-line design and text clarity. The practicality test likewise yielded a "highly practical" rating, with scores of 88% from the BK teacher and 88.8% from the nine participating students.

Disseminate Stage

The dissemination stage was carried out on a limited scale at SMA Swasta Dwi Tunggal by introducing the final product to the BK teacher as its prospective primary user. The teacher was briefed on the objectives of the media, its procedures of use, the implementation steps for group guidance sessions, and the anticipated benefits for students' post-disaster trauma recovery, in line with the aim of the Develop and Disseminate stages of the 4D model to test, refine, and distribute the product to its target users in a directed manner (Sunzuma & Umbara, 2025).

Discussion

The high validity and practicality scores indicate that the developed puzzle media satisfies the required standards of content, presentation, language, design, and alignment with the objectives of guidance and counseling services, confirming its suitability as a tool for post-disaster trauma recovery. These findings corroborate those reported by Pertiwiwati et al. (2021), who demonstrated that play therapy effectively reduced PTSD symptoms among children following a flood disaster. The media is grounded in the principles of play therapy, an approach that uses play activities to help children express thoughts, feelings, and experiences that are difficult to communicate verbally (Landreth, 2002). As students assemble the puzzle, their attention is gradually redirected from traumatic experiences toward a more positive, enjoyable, and challenging activity, which helps reduce emotional tension and anxiety while increasing comfort during the counseling session. One possible explanation for this outcome is that puzzle activities require sustained attention and collaborative interaction, both of which facilitate emotional regulation and cognitive distraction from traumatic memories. Practically, the developed media may serve as an alternative low-cost psychosocial intervention for schools located in disaster-prone regions.

The puzzle-assembly activity also allows students to progressively develop thinking, concentration, and problem-solving skills; the sense of achievement gained upon completing the puzzle helps rebuild students' self-confidence, an important factor in psychological recovery after a traumatic experience. Beyond these individual benefits, the media fosters social interaction, as students must discuss, share tasks, assist one another, and cooperate to complete the puzzle — interaction that helps restore social relationships that may have been disrupted by the disaster and creates a supportive group environment in which students feel more comfortable expressing their opinions and emotions. This is consistent with the broader literature on cooperative learning, which shows that structured group tasks strengthen peer relationships, communication, and collective problem-solving among students (Gillies, 2016).

The high practicality rating given by the BK teacher indicates that the puzzle media is easy to implement in group guidance services without requiring complex supporting tools, while students responded very positively, finding the media engaging, enjoyable, and easy to play, and reporting a more active service atmosphere compared with lecture- or discussion-based approaches. These findings align with prior research indicating that trauma healing — the process of recovering from traumatic experience — aims to help individuals overcome its negative effects and restore emotional and mental well-being (Ito Turyadi et al., 2024), that play therapy is effective in supporting trauma healing among child disaster survivors (Pertiwiwati et al., 2021), and that puzzle play therapy specifically helps reduce trauma among post-disaster children (Nengrum & Ramadhani, 2021). Siregar et al. (2022) further note that trauma healing is commonly delivered through mental, behavioral, and counseling approaches to address post-disaster fear, while Fibiyaniti et al. (2024) found puzzle play therapy effective in reducing children's anxiety through distraction techniques. Taken together, these findings support puzzle game media as an effective alternative for group guidance services aimed at post-disaster trauma recovery among students.

CONCLUSION

This study succeeded in developing puzzle game media as a means of post-disaster trauma recovery for students through guidance and counseling services, with the media rated highly valid by both the media expert (90%) and material expert (88.3%), and highly practical by the BK teacher (88%) and students (88.8%). This study contributes to the guidance and counseling literature by demonstrating a concrete example of psychopedagogical media development that integrates play therapy principles with a structured, research-based product development process (the 4D model), an approach that has rarely been applied specifically to post-disaster trauma recovery in Indonesian schools. Practically, the developed puzzle game media offers BK teachers a low-cost, easy-to-implement alternative for group guidance and psychosocial recovery services in disaster-affected schools.

This study is limited by its small trial scope, involving only nine students at a single school, so the findings cannot yet be generalized to a wider population; it also focused solely on the development, validity, and practicality of the media without testing its effectiveness in reducing student trauma levels through an experimental or pre-test–post-test design. Future research is therefore recommended to involve larger samples across different educational levels and locations, employing an experimental design to test the media's effectiveness in reducing trauma levels.

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