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Big Book Sahabat Siaga: A Visual-Adaptive Learning Media to Improve Disaster Preparedness Among Students with Intellectual Disabilities

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Abstract. Indonesia is one of the most disaster-prone countries in the world, yet disaster education remains insufficiently accessible to students with intellectual disabilities, who may have difficulty processing abstract verbal information. This study developed, validated, and evaluated the effectiveness of Big Book Sahabat Siaga, a visual-adaptive learning medium designed to support disaster preparedness among students with intellectual disabilities. The study adopted a Research and Development approach guided by the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). A need analysis was conducted through interviews and classroom observations at a SLB YKK Pacitan in Pacitan Regency. Two media experts and two content experts assessed the product's validity. The researchers subsequently conducted one-to-one, small-group, and field trials before implementing the product with four junior-secondary-level students with intellectual disabilities who were able to read and spell, with support from one classroom teacher, at SLB YKK Pacitan and SLB Negeri Ngadirojo Pacitan. The results demonstrated that the product achieved a validity score of 84.4% from media experts and 86% from content experts. Practicality scores were 83.33% in the one-to-one trial, 61.67% in the small group trial, and 85.00% in the field trial. The lower practicality score observed during the small-group trial led to revisions to the illustration, which were implemented before the field trial. Following the implementation at SLB YKK Pacitan, students' mean comprehension score increased from 63.46% on the pretest to 96.15% on the posttest. These findings suggest that Big Book Sahabat Siaga, which combines dominant visuals, simplified language, and numbered step-by-step illustrations, can serve as a valid, practical, and effective medium for disaster preparedness instruction among students with intellectual disabilities.

Keywords: *big book; disaster preparedness; intellectual disability; special education; visual-adaptive media*

INTRODUCTION

Indonesia lies at the convergence of three major tectonic plates—the Indo-Australian, Eurasian, and Pacific plates—and sits within the Pacific Ring of Fire, placing the country among the world's most disaster-prone countries . According to the National Disaster Management Authority [1], more than 3,100 disaster events were recorded across Indonesia by the end of 2025, causing casualties, displacement, and damage to homes and infrastructure. Pacitan Regency, located along the southern coast of East Java, is particularly vulnerable to megathrust earthquakes, which threaten to trigger a tsunami along the southern coastline.

In recent years, governments and schools have increasingly incorporated disaster education into educational programs, with evidence indicating that school-based disaster education can significantly strengthen students' preparedness [4], [5]. However, these initiatives have not adequately addressed the needs of students with disabilities. The United Nations Office for Disaster Risk Reduction [6] reported that most persons with disabilities lack personal disaster preparedness plans, face major barriers to evacuation, and have limited access to disaster-risk information in accessible formats. Evidence from Indonesia further highlights this gap. Mauliza and Sakdiah [2] found that the capacity of special-school communities to support students with disabilities during earthquakes and tsunamis remains moderate. Similarly, Rofiah et al. [3] identified that effective disaster education for students with disabilities requires adapted instructional approaches and learning media that reflect their individual characteristics and learning needs.

Students with intellectual disabilities require particular attention in disaster education because they typically have below-average intellectual functioning together with limitations in adaptive behavior [7], [8]. They struggle to process complex instructions and abstract symbols and often have a relatively short attention span [9]. Their ability to respond effectively during emergencies is closely associated with their capacity to understand safety instructions and recognize potential risk [10]. Preliminary observation and interviews conducted by the research team at SLB YKK Pacitan in February 2026 found that the school had no disaster-education medium specifically designed for students with intellectual disabilities. Existing materials were

predominantly text-based and abstract, while disaster education was largely reliant on periodic simulations led by the regional disaster agency (BPBD). Consequently, teachers had limited access to instructional media that could be used independently and integrated into routine classroom instruction.

Several disaster education media have been developed in Indonesia to support students with intellectual disabilities, including puzzles [11], thematic songs [12], audio-visual simulation [13], disaster-mitigation gymnastics [14], instructional videos [15], busy boards [16], pop-up books [17], interactive game-based slides [18], and virtual reality [19]. Although these studies have reported positive outcomes, the existing interventions remain constrained in several aspects. Most were conducted on a small scale, limited to a single type of hazard, and not designed to be easily duplicated or suitable for repeated use at home with parental support. These limitations point to the need for a dominant-visual, low-cost, and easily reproducible medium that can be integrated into routine classroom instruction.

In response to these needs, the researchers developed *Big Book Sahabat Siaga*, a large-format illustrated book that applies visual-adaptive design principles, including dominant imagery, short text, high-contrast colors, and numbered, step-by-step safety procedures, to teach disaster preparedness among students with disabilities. This study aimed to (1) describe the development of *Big Book Sahabat Siaga* using the ADDIE model, (2) examine its validity and practicality as a learning medium, and (3) determine its effectiveness in improving students' comprehension of disaster-preparedness.

METHODS

Study area

This study employed a Research and Development (R&D) approach guided by the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The model was selected because it provides a systematic framework for identifying learning needs, designing and developing the product, implementing it in the intended setting, and evaluating its effectiveness [20]. This research and development study was conducted at two special schools in Pacitan Regency, East Java, Indonesia. SLB YKK Pacitan served as the primary research site for the need analysis, product development, and try-out stages, while SLB Negeri Ngadirojo Pacitan served as the secondary site for product implementation. The study involved four junior-secondary-level (SMP) students with intellectual disabilities who could read and spell simple words. One classroom teacher also participated in the study to facilitate the learning activities and assist the research team in observing students' responses. The four students participated progressively across the try-out stages: one student took part in the one-to-one evaluation, two students (including the participant from the previous stage) participated in the small-group trial, and all four students participated in the field trial and subsequent implementation using a pretest–posttest design. Product validation was conducted by four experts, comprising two media experts and two content experts.

Procedures

Analysis

Needs analysis was conducted through semi-structured interviews with two teachers and classroom observation of prospective student participants. The analysis focused on four areas: students' learning characteristics, their prior exposure to disaster-mitigation instruction, the availability of disaster-related learning media at school, and teachers' expectations for the proposed learning medium.

Design

The findings from the analysis stage informed the storyline, visual design principles, and page-by-page storyboard of the big book. The design followed a "one page, one focus, one main action" approach, with each page presenting a single key idea and its corresponding action. This approach was intended to avoid presenting information in lengthy blocks of text.

Development

The product was developed according to the storyboard and validated by two media experts and two content experts using five-point Likert-scale questionnaires. The media validation instrument comprised five aspects: display design, typography, illustration, layout, and usability. The content validation instrument covered content appropriateness, factual accuracy, content presentation, language, and suitability for students with intellectual disabilities. Each aspect consisted of five items, resulting in a total of 25 items for each validation instrument.

Following expert validation, the product was revised and subjected to one-to-one, small-group, and field trials. The one-to-one trial used a 12-item observation sheet covering three aspects: display, comprehensibility, and usability. The small group and field trials used a 15-item instrument covering four

aspects: practicality of use, student engagement, content comprehension, and student response. These instruments were rated on a four-point scale.

Implementation

The validated product was implemented during classroom instruction at SLB YKK Pacitan. Student learning outcomes were assessed using a pretest and posttest consisting of 13 illustrated two-option multiple-choice items addressing three areas: hazard recognition, hazard causes, and self-protective actions. The product was also implemented at SLB Negeri Ngadirojo Pacitan to assess its feasibility across different school contexts. At this site, implementation was only evaluated through classroom observation.

Evaluation

Formative evaluation was integrated throughout the development process. At each stage, the research team reviewed the results of expert validation, product try-outs, and implementation outcomes to determine the product's validity, practicality, and effectiveness and to inform subsequent revisions.

Data analysis

Expert-validation and try-out data were analyzed descriptively by calculating the percentage of the obtained score relative to the maximum possible score. The resulting percentages were then categorized using Akbar's [21] validity criteria and the corresponding practicality criteria for try-out data. Pretest-posttest data were analyzed using descriptive statistics. Accordingly, the observed gain is interpreted as a descriptive indication of change rather than as evidence of statistical significance. Qualitative data obtained from interviews, observation, and validators' comments were analyzed descriptively to complement the quantitative findings.

RESULTS AND DISCUSSION

Needs analysis and product design

Interviews and classroom observation showed that the students had limited reading abilities and an attention span of roughly 30 minutes. They also appeared to understand pictures, stories, and demonstrations far more easily than text-based information. In disaster mitigation instruction, their prior learning experiences focused mainly on earthquakes and relied on demonstration. However, students struggled with unfamiliar vocabulary, and neither school had a disaster-specific medium tailored to students with intellectual disabilities.

In response to this condition, Big Book Sahabat Siaga was designed as a visually oriented, easily reproducible medium that presents disaster preparedness information through realistic, large-format imagery, simple repeated keywords, contextual stories, and concretely sequenced safety steps. The content progresses from hazard recognition to appropriate actions before, during, and after disaster across six hazard types: earthquake, tsunami, flood, landslide, fire, and drought.

Product development and expert validation

The storyboard was developed into a big book entitled *Sahabat Siaga: Belajar Mengenal Bencana dan Cara Tetap Aman* (Alert Friend: Learning to Recognize Disasters and Stay Safe). Figures 1-5 present representative pages from the final product, including the cover, hazard-recognition content, and step-by-step safety-action panels for different hazard types. The complete product is openly available at: https://drive.google.com/file/d/1EypmXcvolGZSbQRuEdj0ENdB8-azoWBc/view.

Figure 1. Cover page of Big Book Sahabat Siaga.

Figure 2. "During an Earthquake" page, presenting four numbered safety-action panels.

Figure 3. "Disaster-Preparedness Bag" page, showing items to prepare before a disaster.

Figure 4. "During a Fire" page, presenting six numbered safety-action panels.

Figure 5. Hazard-warning-signage recognition page.

After completing the development phase, the product was validated by the experts to test its feasibility. The results of expert validation are presented in Table 1 . The media experts rated the product as valid (84.4%), while the content experts rated it as highly valid (86%). The results are reported separately because the two experts assess different aspects of the product: media and content quality.

Table 1. Expert validation results.

Validator	Aspects Assessed	Score (%)	Category
Media experts (n = 2)	Display design, typography, illustration, layout, usability	84.4	Valid
Content experts (n = 2)	Content appropriateness, factual accuracy, presentation, language, suitability for students with intellectual disabilities	86.0	Highly valid

The validators recommended several revisions to improve the product's accessibility, clarity, and alignment with disaster preparedness standards. These revisions included increasing the font size to a minimum of 14 pt, simplifying instructions to two or three steps per sentence, completing the contents of the "disaster-preparedness bag" page, aligning hazard signage with BNPB Regulation No. 3 of 2025, directing tsunami-evacuation illustrations away from the coastline, and adding material on organic and inorganic waste sorting as part of flood-mitigation education. All recommended revisions were incorporated before the product entered the try-out stage.

Practicality (try-out results)

The revised product was tested progressively through one-to-one trial, a small-group trial, and a field trial, as summarized in Table 2.

Table 2. Practicality results across try-out stages.

Try-out stage	n	Score obtained	Maximum score	Percentage (%)	Category
One-to-one trial	1	50	60	83.33	Practical
Small-group trial	2	37	60	61.67	Fairly practical
Field trial	4	102	120	85.00	Practical

Practicality dipped at the small-group stage, consistent with observers' notes that several illustrations remained unclear and it was harder for students to connect the images with the intended message. The illustrations were revised accordingly, and the field-trial score subsequently increased to 85.00%. This pattern illustrates the value of iterative try-out in the R&D process, as group-based testing can reveal usability issues that may not become apparent during individual evaluation.

Effectiveness of the Learning Medium

Big Book Sahabat Siaga was implemented with the four students participating in field-trial at SLB YKK Pacitan. The researchers administered a 13-item pretest and posttest. The results are presented in Table 3.

Table 3. Pretest–posttest results at SLB YKK Pacitan (13 items).

Statistic	Pretest	Pretest (%)	Posttest	Posttest (%)
Mean	8.25	63.46	12.50	96.15

The average score increased from 63.46% on the pretest to 96.15% on the posttest, representing a gain of 32.69 percentage points. All four students showed improvement in their individual scores. At SLB Negeri Ngadirojo Pacitan, the product was implemented without a pretest–posttest assessment. Classroom observation showed that students were enthusiastic about the medium, particularly when viewing the illustrations and following the accompanying story.

Discussion

The high validity scores, particularly for display design and usability, underscore the importance of dominant and concrete illustration when designing learning media for students with intellectual disabilities [22], [23]. By contrast, the lower score for typography and layout, together with validators' recommendation to increase the font size, highlight the need to carefully consider readability and visual accessibility in media design. This consideration is particularly relevant given the well-documented reading and visual-processing difficulties experienced by students with intellectual disabilities [24], [7].

The practicality trajectory, high in one-to-one, lower in small group, and higher again in field trial, demonstrates the value of conducting iterative try-outs in ADDIE-based R&D [26], [27]. The findings are also consistent with previous research on big books, which suggests that large, clear illustrations and short text can reduce the amount of teacher guidance required during use [28], [29]. In the present study, the improvement following illustration revisions is consistent with Mayer's [25] segmenting principle in the Cognitive Theory of Multimedia Learning, under which breaking a safety procedure into small, sequential, numbered units such as those used on the four-panel "During an Earthquake" page may reduce cognitive load for learners with limited working memory.

The 32.69-percentage-point increase in students' comprehension is consistent with the positive outcomes reported for other disaster-mitigation media developed for students with intellectual disabilities, including the pop-up book for disability (POBODY) [17] and song-and-movement-based earthquake gymnastics [14]. Taken together, these findings suggest that visual, repetitive, and step-by-step media can effectively support learning among students with intellectual disabilities regardless its specific format. Compared with media that require electronic devices or supplementary props, such as audio-visual simulation [13] and busy boards [16], the big book offers a practical advantage that it requires no specialized equipment and can be taken home for continued learning. In addition, the barcode-linked video embedded in Big Book Sahabat Siaga provides an optional audio-visual component that extend the medium beyond static print and is consistent with multimedia-learning theory.

This study has notable limitations. First, the effectiveness of Big Book Sahabat Siaga was assessed with only four students at a single school, so the pretest-posttest gain should be treated as preliminary evidence rather than as a basis for generalizing the medium's effectiveness to a broader population [5]. Second, the absence of a control group limits the extent to which the observed improvement can be attributed specifically to the learning medium, as gains may also have been influenced by repeated instructions from the teachers. Future research should therefore employ larger-sample, controlled research designs and longer implementation periods.

CONCLUSION

Big Book Sahabat Siaga was developed through the ADDIE model, encompassing needs analysis, design, development, expert validation, try-out, and implementation at two special schools in Pacitan. The product received validity scores of 84.4% from the media experts and 86% from the content experts. Its practicality scores were 83.33% in the one-to-one stage, 61.67% in the small-group stage, and 85.00% in the field-trial stage after illustration revision. The implementation indicated a preliminary gain, with average student comprehension increasing from 63.46% on the pretest to 96.15% on the post-test. These findings indicate that *Big Book Sahabat Siaga* has potential as a viable, low-cost, and reproducible medium for teaching disaster preparedness to students with intellectual disabilities. However, given the small sample and the absence of a control group, its effectiveness should be further examined through larger-scale controlled studies.

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REFERENCES

[1] Badan Nasional Penanggulangan Bencana. (2025). Infografis bencana Indonesia tahun 2025. BNPB.

[2] Mauliza, E., & Sakdiah, H. (2021). Tingkat kesiapsiagaan komunitas sekolah dalam membantu anak berkebutuhan khusus menghadapi bencana gempa bumi dan tsunami di sekolah luar biasa. Jurnal Penelitian Pendidikan Geografi, 6(3), 175–186.

[3] Rofiah, N. H., Kawai, N., & Hayati, N. (2021). Key elements of disaster mitigation education in inclusive school setting in the Indonesian context. Jàmbá: Journal of Disaster Risk Studies, 13(1), Article a1159.

[4] Harada, T., Shoji, M., & Takafuji, Y. (2023). Intergenerational spillover effects of school-based disaster education: Evidence from Indonesia. International Journal of Disaster Risk Reduction, 85, Article 103505.

[5] Yusuf, R., Razali, Sanusi, Maimun, Fajri, I., & Gani, S. A. (2022). Disaster education in disaster-prone schools: A systematic review. IOP Conference Series: Earth and Environmental Science, 1041(1), Article 012034.

[6] UNDRR. (2023). Global survey on persons with disabilities and disasters. United Nations Office for Disaster Risk Reduction.

[7] Kustawan, D. (2016). Pendidikan anak berkebutuhan khusus. Luxima.

[8] Stough, L. M. (2015). World report on disability, intellectual disabilities, and disaster preparedness. Journal of Policy and Practice in Intellectual Disabilities, 12(2), 138–146.

[9] Amanullah, A. S. R. (2022). Mengenal anak berkebutuhan khusus: Tunagrahita, down syndrome, dan autisme. Al-Murtaja: Jurnal Pendidikan Islam Anak Usia Dini, 1(1), 1–14.

[10] Park, E. Y. (2023). Factors affecting disaster or emergency coping skills in people with intellectual disabilities. Behavioral Sciences, 13(12), Article 1018.

[11] Arumsari, F. A. (2020). Pengaruh penggunaan puzzle sebagai media penyuluhan mitigasi bencana kebakaran bagi anak penyandang tunagrahita [Unpublished undergraduate thesis]. Poltekkes Kemenkes Yogyakarta.

[12] Armindony, F. F. (2022). Pengaruh penggunaan media lagu "Awas Ada Gempa" terhadap peningkatan kemampuan mitigasi bencana gempa bumi bagi anak tunagrahita [Unpublished undergraduate thesis]. Universitas Pendidikan Indonesia.

[13] Rhenaldy, A. (2025). Pengaruh metode simulasi dengan media audio visual terhadap peningkatan pemahaman anak tunagrahita dalam menghadapi bencana gempa bumi [Unpublished undergraduate thesis]. Universitas Pendidikan Indonesia.

[14] Zaki, M., Chatra, E., & Arif, E. (2025). Analisis metode penyampaian pesan mitigasi bencana pada anak disabilitas (studi kasus edukasi mitigasi bencana melalui senam mitigasi bencana gempa kepada siswa SLBN 1 Kota Padang). JKOMDIS: Jurnal Ilmu Komunikasi dan Media Sosial, 5(3), 655–691. https://doi.org/10.47233/jkomdis.v5i3.3513

[15] Sondy, Y. (2014). Efektivitas media video pembelajaran pengurangan risiko bencana alam untuk anak tunagrahita tipe ringan [Unpublished undergraduate thesis]. Universitas Negeri Yogyakarta.

[16] Indryastuti, H. N. (2024). Pengaruh penggunaan media busy board terhadap pengetahuan, sikap, dan praktik mitigasi bencana kebakaran pada siswa sekolah dasar. Jurnal Promosi Kesehatan Mandiri, 3(2), 88–100.

[17] Mansur, A. R., Sari, I. M., Herien, Y., Deswita, D., Resqitha, K., Berlian, S., & Amelia, R. S. (2021). Peningkatan kesiapsiagaan bencana pada anak tunagrahita ringan menggunakan pop up book for disability (POBODY) di SLB Negeri 1 Padang. Jurnal Warta Pengabdian Andalas, 28(3), 263–271. https://doi.org/10.25077/jwa.28.3.263-271.2021

[18] Sari, R. N. (2022). Pengembangan PowerPoint interaktif desain serious game sebagai media edukasi mitigasi bencana gempa bumi pada siswa tunagrahita [Unpublished undergraduate thesis]. Universitas Negeri Malang.

[19] Ayunda, D. T., & Rofiah, N. H. (2025). Media virtual reality untuk mitigasi bencana gempa bumi pada pembelajaran peserta didik dengan disabilitas intelektual. Didaktika: Jurnal Pemikiran Pendidikan, 31(2), 170–183.

[20] Branch, R. M. (2009). Instructional design: The ADDIE approach. Springer.

[21] Akbar, S. (2013). Instrumen perangkat pembelajaran. PT Remaja Rosdakarya.

[22] Gresilia, T., Junaidi, Arifmiboy, A., & Kamal, M. (2023). Penggunaan media gambar dalam pembelajaran PAI pada anak berkebutuhan khusus (anak tunagrahita). Dewantara: Jurnal Pendidikan Sosial Humaniora, 2(1), 159–178.

[23] Restu Kurnia, I., Rifqia, M. W., Cahyo Pratomo, I. F., & Riansyah, T. R. (2024). Penggunaan media pembelajaran visual bagi anak tunagrahita: Observasi dalam kegiatan belajar di PKBM Sehati. Didaktik: Jurnal Ilmiah PGSD STKIP Subang, 10(4), 231–241.

[24] Khairun Nisa. (2018). Karakteristik dan kebutuhan anak berkebutuhan khusus. Jurnal Abadimas, 2(1), 1–8.

[25] Mayer, R. E. (2017). Using multimedia for e-learning. Journal of Computer Assisted Learning, 33(5), 403–423.

[26] Ayu, G. A. P. C. D., & Sugiharni, G. A. D. (2018). Pengujian validitas konten media pembelajaran interaktif berorientasi model pembelajaran guided discovery. Jurnal Ilmiah Pendidikan dan Pembelajaran, 2(2), 149–159.

[27] Fasa, I. A., & Purwanti, K. L. (2023). Pengembangan media pembelajaran berbasis website mata pelajaran matematika untuk siswa madrasah ibtidaiyah. Sekolah Dasar: Kajian Teori dan Praktik Pendidikan, 32(1), 15–24.

[28] Mahsun, M., & Koiriyah, M. (2019). Meningkatkan keterampilan membaca melalui media big book pada siswa kelas IA MI Nurul Islam Kalibendo Pasirian Lumajang. Bidayatuna: Jurnal Pendidikan Guru Madrasah Ibtidaiyah, 2(1), 60–78.

[29] Syelviana, N., & Hariani, S. (2019). Pengembangan media big book dalam pembelajaran membaca permulaan di kelas I sekolah dasar. Jurnal PGSD, 7(1), 1–10.