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Development of the "Disaster Preparedness: Disaster-Resilient Campus" Book as an Educational Medium for Nursing Students

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Abstract Higher education institutions, through their three pillars, play a strategic role in disaster management, particularly through education, research, and community service activities. This role is realized through the active participation of lecturers and students in various programs, both on campus and in the community, and is reinforced by the Resilient Campus program launched by the Directorate General of Higher Education, Research, and Technology of the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia, as preparedness training for students and campus staff. This study aims to develop a book as a learning medium on disasters for the academic community. The study uses the Research and Development method with the ADDIE (Analyze, Design, Develop, Implement, Evaluate) model. The resulting product was validated by experts in disaster management, emergency nursing, language, and visual communication design, and its acceptability was tested on nursing students using the USE questionnaire. The validation results showed that the textbook ranged from valid to highly valid in terms of content, presentation, appearance, and language, while the acceptability test results showed a very good level of usability. Thus, the textbook "Disaster Preparedness: Disaster Resilient Campus" is deemed suitable for use as a disaster-learning medium in higher education.

Keywords: textbook, disaster preparedness, disaster-resilient campus, nursing students

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1. INTRODUCTION

Indonesia is one of the countries located at the boundary between active tectonic plates. These geological conditions make Indonesia a fertile country with abundant natural resources. However, this condition puts Indonesia at risk of disasters. Meanwhile, the community does not yet have a high level of disaster awareness (Addiarto & Yunita, 2019). In addition, there is no specific figure for the percentage of preparedness among Indonesians. The preparedness level among Indonesians varies depending on the type of disaster and its location.

The Disaster Risk Reduction (DRR) work program emphasizes the importance of cross-sectoral cooperation and partnerships to implement disaster mitigation and advance sustainable development. The role of organizations/institutions in disaster management is crucial. Universities are one of the institutions that can play a role in disaster risk reduction activities. Higher education institutions have an obligation to educate the nation. They also play an important role in increasing the capacity of the community to prevent and reduce disaster risk. On the other hand, with thousands of students, lecturers, and educational staff carrying out activities every day on campus, higher education institutions are one of the communities that are at high risk from the impact of natural disasters.

Higher education institutions play a strategic role in disaster management through the implementation of the three pillars of higher education: education, research, and community service. One of the main challenges in disaster management is the low level of public knowledge and preparedness, which indirectly contributes to the high number of casualties when disasters occur (Aryono et al., 2016). To date, there are no specific figures on the level of preparedness among Indonesians, especially among higher education institutions. Therefore, strengthening knowledge and preparedness for disasters from the higher education level is very important to minimize risk.

This role is reinforced through the Resilient Campus Program launched by the Directorate General of Higher Education, Research, and Technology of the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia, as an effort to improve the preparedness of students and campus staff in facing emergencies and disasters (Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi, 2024). In supporting the implementation of this program, the development of teaching materials in the form of textbooks is considered necessary as an educational medium that can help students understand the concept of disaster preparedness in a systematic and contextual manner. Furthermore, the development of this book is a form of academic support for the implementation of the resilient campus program in higher education institutions. However, in practice, disaster preparedness programs in higher education institutions are still uneven and not fully integrated into the curriculum, even though several campuses have begun to develop disaster risk assessments, form disaster preparedness teams, and develop early warning systems on campus (Tjoetraa & Maifizar, 2019; Widianto, 2019). In addition, the availability of teaching materials that specifically discuss disaster preparedness for students is still very limited. Based on these conditions, this study initiated the development of this disaster preparedness book as a learning resource for students.

In its development, this book focuses on nursing students, given that the nursing profession plays an important role in disaster management, particularly in providing first aid, emergency health services, and post-disaster health recovery. Therefore, strengthening disaster preparedness competencies during the educational period is very important for nursing students. In addition, students, as a major part of the academic community, act as agents of change who are expected to have critical thinking, creativity, problem-solving skills, and high social sensitivity (Napsiyah et al., 2023; Syaiful, 2023). Student involvement in disaster education is vital in encouraging them to become extensions for disseminating disaster preparedness messages to the campus community and society through educational activities, training, and community service.

In general, this book, developed for nursing students, consists of seven main topics, namely disaster material, disaster risk, disaster mitigation, disaster preparedness exercises, first aid emergency response, post-disaster, and local disasters. These seven topics are general in nature and can be applied to various fields of study, which means they are not only for nursing students. However, in practice, this book is specifically focused on nursing students because it is based on the important role of nurses in disaster management from the emergency response period throughout the post-disaster period, where nurses are involved in the process. Therefore, the material in this book is designed to support the development of disaster preparedness competencies that are relevant to nursing education and practice.

The development of this book is not only based on the ADDIE instructional design model as a systematic development procedure but also on several relevant educational theories. The theoretical approach applied refers to the principles of andragogy proposed by Malcolm Knowles, which emphasize the importance of learner-centered learning, active participation, and the use of real experiences in the learning process. In addition, the design of learning activities is also influenced by David A. Kolb's experiential learning theory, which emphasizes the learning process through experience, reflection, conceptualization, and application in practice. The integration of these theoretical foundations with the concept of disaster education aims to ensure that the book developed not only provides a conceptual understanding of disaster risk, mitigation, preparedness, and post-disaster management, but also encourages students to develop practical skills and critical thinking abilities in dealing with disaster situations.

At the international level, various studies show that disaster education in higher education has developed towards the use of digital learning media, simulations, and interactive modules that have been proven to improve students' literacy and preparedness skills (Saiboon et al., 2021; Koca & Arkan, 2020). However, most of these studies focus on disaster contexts in developed countries, the development of digital-based media without comprehensive usability testing, or the general student population, rather than nursing students specifically. Furthermore, there is still limited research that fully integrates the ADDIE model, from needs analysis to expert feasibility testing and usability testing, as a basis for improving learning products (Genç et al., 2025). There are no disaster textbooks compiled based on the local context of West Kalimantan, Indonesia, which has unique characteristics of hydrometeorological disasters and land fires. This book is systematically organized to provide a structured learning experience so that students can achieve specific learning objectives (Gunawan, 2022). Various studies show

that a structured approach to disaster learning, including through simulation media and teaching modules, can improve the knowledge, skills, confidence, and disaster preparedness competencies of nursing students (Tong et al., 2024; Park & Hwang, 2024; Doumi et al., 2024). Based on this background, this study focuses on the development of the book "Disaster Preparedness" as a learning medium to support the improvement of disaster preparedness in higher education, especially among nursing students.

2. METHODS

This study uses the research and development (R&D) approach ADDIE (analyze, design, development, implementation, evaluation) to produce the book "Disaster Preparedness: Disaster Resilient Campus" as a learning medium. This research has also been declared to have passed the health ethics review at the Komisi Etik Penelitian Kesehatan (KEPK) STIKes Yarsi Pontianak with the number 059/KEPK/STIKes.YSI/V/2025. The ADDIE research model can be seen in Figure 1.

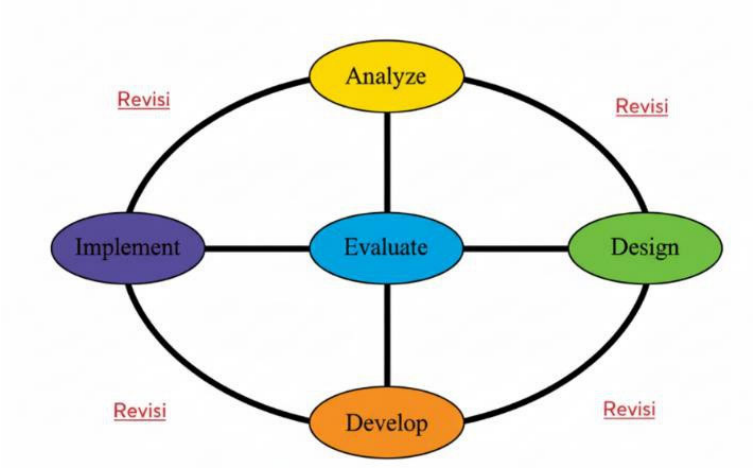


Figure 1. ADDIE model development chart (Branch, 2009)

The Analyze stage involves analyzing disaster preparedness material requirements, student characteristics, and teaching materials through interviews with relevant stakeholders. The Design stage includes developing a book framework, material flow, and learning approach in the form of a storyboard as a preliminary draft. In the development stage, the book was validated by experts consisting of disaster experts from Badan Penanggulangan Bencana Daerah (BPBD), emergency nursing lecturers, Indonesian language lecturers, and visual communication design lecturers. Input from validators was used to refine the book, then an acceptability test was conducted on 10 students using the USE questionnaire developed by Lund in 2001 and re-evaluated by Gao, Kortum, and Oswald (Gao et al., 2018), which showed that this instrument has strong convergent validity with correlation coefficients ranging from 0.60 to 0.81 ($p < 0.001$), making it suitable for measuring the construct under study.

Expert validator assessment was conducted using a validation sheet adapted from the BSNP Teaching Material Development Guidelines, covering four aspects: material/content,

presentation, readability, and language. Each item was assessed using a four-point Likert scale (1–4). Expert validation was analyzed quantitatively and descriptively by calculating the Content Validity Index (CVI) to assess content validity and the Interclass Correlation Coefficient (ICC) to assess inter-rater reliability. In addition, an acceptability test was conducted using the USE questionnaire, with the interpretation of acceptability test scores as presented in Table 1.

Table 1. Interpretation of acceptability test scores

CRITERIA	VALIDATION LEVEL
0-20%	very Inappropriate,
21-40%	Inappropriate
41-60%	Fairly Inappropriate
61-80%	Appropriate
81-100%	Highly Appropriate

Source: Adapted from Akbar (2017)

3. RESULTS

The learning media developed in the form of a textbook entitled "Disaster Preparedness: Disaster Resilient Campus" use the ADDIE model. The development is based on the steps taken from the ADDIE model.

a. **Analysis:** Analysis was conducted through interviews with four emergency and disaster nursing lecturers. The results showed that disaster preparedness education is important and relevant for students, but the material taught has not been adapted to the local hazards and characteristics of West Kalimantan, such as forest fires and floods, and there are no textbooks on disasters available. The campus already has support facilities such as the Tangguh Student Activity Unit, presentation-demonstration methods, and tabletop media. Student characteristics show active participation in discussions and case-based learning, although enthusiasm varies. Analysis of teaching materials shows that classroom facilities are adequate, but the availability of teaching materials is still limited to tabletop media without disaster nursing textbooks.

b. **Planning Stage (Design):** At this stage, a draft of the book "Disaster Preparedness: Disaster Resilient Campus" was compiled with seven main topics: disaster material, risk, mitigation, preparedness exercises, first aid, post-disaster response and recovery, and local disasters. The material is compiled from literature, Indonesia's National Disaster Management Agency (BNPB) guidelines, government regulations, and Indonesian Association of Nursing Education Institutions (AIPNI) and Association of Indonesian Higher Education Institutions for Vocational Nursing (AIPVIKI) curricula. Each topic includes learning objectives, material descriptions, summaries, comprehension tests, and practical assignments. Three learning methods are selected, namely blended learning, problem-based learning,

and simulation-based learning, to support the improvement of students' knowledge, attitudes, and skills

c. **Development Stage**: In terms of general appearance, the author designed the front cover to represent the title, "Disaster Preparedness Campus." The book is also designed with supporting illustrations, images, and diagrams, especially for topics related to skills. The author designed the front cover to represent the title "Disaster Preparedness Campus," as shown in Figure 2, while the revised version is presented in Figure 3.

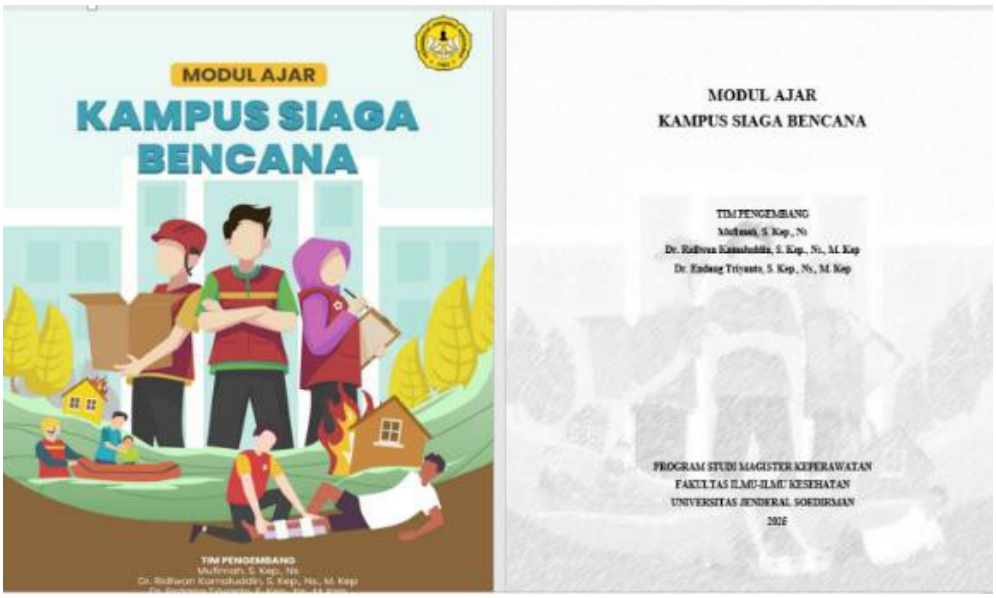


Figure 2. Cover before revision



Figure 3. Cover after revision

The next process in this development stage is expert validation by several experts. Expert validation is carried out on four aspects. The first aspect is disaster-related material/content and was carried out by three disaster experts from the Regional Disaster Management Agency (BPBD). The next expert validation is on emergency nursing

material/content and was carried out by three nursing lecturers. Next, readability validation was conducted by three Indonesian language lecturers. Finally, presentation/appearance validation was conducted by three visual communication design lecturers. The expert validation results, expressed as the Content Validity Index (CVI) and Intraclass Correlation Coefficient (ICC), are presented in Table 2.

Table 2. Expert validation results for several aspects of the textbook

Validation Aspects	Score CVI	Score ICC (average measure)
Disaster Material Validation	0.79	0.750
Validation of Emergency Nursing Materials	1	0.900
Readability and Language Validation	1	0.828
Presentation/Display Validation	0.81	0.783

Source: Primary Data (2025)

Based on expert validation results, all aspects of assessment showed good to excellent quality. The disaster material validation aspect received a CVI score of 0.79 with an ICC of 0.750, indicating adequate assessment consistency. The emergency nursing material aspect received the highest score, namely CVI 1 and ICC 0.900, indicating very high suitability and reliability. In terms of readability and language, the CVI score also reached 1 with an ICC of 0.828, indicating excellent clarity and readability. Meanwhile, the presentation/appearance aspect received a CVI of 0.81 and an ICC of 0.783, indicating that the book's appearance was considered good and consistent among assessors. Overall, the textbook was declared valid and reliable for use.

d. **Implementation Stage**: This stage involved 10 students as respondents. Data was obtained by distributing questionnaires. Technically, the acceptability test was conducted by providing a draft of the book and briefly explaining its contents. The students were then asked to read it within three days. After three days, the researchers distributed questionnaires to be filled out. The results of the acceptability test are presented in Table 3.

Table 3. Results of the book acceptability assessment using the USE questionnaire (n=10)

Usability Category	Number of Items	Total Respondent Score	Average (%)
Usefulness	5	220	88
Ease to Use	5	207	82.8
Ease of Learning	3	127	84.7
Satisfaction	3	130	86.7
Total		684	85.53

Source: Primary Data (2025)

The overall analysis results of the book "Disaster Preparedness: Disaster Resilient Campus" show a very good level of usability with an average score of 85.53%. These results indicate that users, namely nursing students, responded positively to the usefulness, ease of use, ease of learning, and satisfaction of the book.

e. **Evaluation**: The evaluation stage was carried out through formative and summative evaluations. Formative evaluations were conducted continuously at every stage of development, from needs analysis to implementation. Meanwhile, summative evaluations showed that the textbook "Disaster Preparedness: Disaster Resilient Campus" was deemed suitable for use as a learning medium for disaster management, especially for nursing students. This book is designed to be used as supporting teaching material in several courses related to disasters, such as disaster nursing, community nursing, and emergency nursing. The target users of this book are nursing students at the intermediate to advanced levels who have acquired the basics of nursing science. In practice, this book is designed for various learning activities such as disaster case study analysis, preparedness exercises, disaster victim management simulations, and lecture-style material delivery. Its use can be facilitated by lecturers who teach courses related to disasters or emergencies in nursing education.

4. DISCUSSION

The first stage of research describes the process of developing the book "Disaster Preparedness: Disaster Resilient Campus" through needs analysis, content design, expert validation, and usability testing. The analysis results showed that STIKes Yarsi Pontianak did not yet have any disaster learning media other than tabletop exercises, so the development of this book was considered relevant and received full support from lecturers, including recommendations for the addition of local disaster material. In the design stage, the researchers compiled the book's content structure based on the results of the needs analysis and adult learning principles (andragogy). The book was designed in print format with core material covering disaster concepts, disaster risks, mitigation, preparedness exercises, first aid, post-disaster response and rehabilitation, and local disasters. The presentation was supplemented with learning objectives, illustrations, summaries, and case studies to enhance understanding.

In the design stage, researchers also referred to the theory of adult learning (Andragogy) according to Knowles (1998), which theoretically states that andragogy learning must be planned appropriately in order to obtain learning activities that are suitable for adults(Knowles, 1998). In line with Knowles' andragogy principles, which demand relevance and contextuality for adult learners, research by Pratiwi (2023) shows that the integration of risk management into the educational process must be designed so that the material is applicable and connected to the local context. In the initial stage, it is necessary to design themes that are interesting and relevant to adults, followed by curriculum development. Then, learning techniques must be carried out in a way that is motivating and enjoyable for adult learners (Sugiyanto & Wahyuni, 2020). Therefore, at the design stage, the textbook was developed using an interactive learning

approach by integrating communicative language and contextual disaster case studies to improve students' understanding of disaster preparedness concepts.

The development stage involved validation by experts in disaster management, emergency response, language, and presentation based on BSNP standards. The validation scores indicate categories ranging from acceptable to highly acceptable (CVI 0.79–1; ICC 0.75–0.90). Experts also provided qualitative input, such as adding material on the disaster response phase, disaster risks, types of mitigation, and improving first aid illustrations. All recommendations were incorporated into the revised book. These findings are in line with previous development studies, such as the STEM-based disaster mitigation module by Septaria (2020), which emphasizes the importance of expert involvement in producing valid and high-quality teaching materials (Septaria et al., 2020). Thus, the developed book meets the requirements for content, presentation, and language, and is ready to be tested at the implementation stage.

During the implementation stage, usability testing using the USE instrument on 10 respondents showed an overall score of 85.53% (excellent category). The aspects of usefulness (88%), ease of use (82.8%), ease of learning (84.7%), and satisfaction (86.7%) confirm that the book is easy to use, useful, and provides an enjoyable learning experience. Overall, the development of this book has resulted in a valid, interesting, and functional learning medium. In addition to being a learning resource, this book has the potential to increase students' awareness, practical knowledge, and preparedness in dealing with disaster situations on campus. This usability test (USE) is also in line with learning media evaluation practices. The literature shows that USE is adequate for assessing users' perceptions of the usefulness and ease of use of teaching materials or learning systems (Gohari et al., 2022).

The expert assessment was not only quantitative, but also provided qualitative input to improve this book. Some of the suggestions provided include adding material on the disaster response phase, disaster risk material (covering the concepts of hazard, vulnerability, and capacity), material on types of mitigation (structural or non-structural), and a special topic on “Disaster Preparedness Campus.” The combination of discussions on hazard, vulnerability, and capacity in this module is in line with field evidence showing that understanding these three components is important for developing effective mitigation strategies (Mulia & Handayani, 2024). There were also several suggestions for improving the emergency response material, such as emphasizing key quality indicators for chest compressions, including accuracy of location and position, accuracy of depth, accuracy of speed, full recoil, and minimal interruption, as well as adding illustrations to the first aid section. Based on this feedback, the researchers revised the content and layout of the book, adding pictures and illustrations of first aid procedures.

This study has several limitations that need to be considered. This study focuses on the process of developing textbooks and assessing their suitability as learning media. Therefore, an in-depth evaluation of the effectiveness of the textbook in improving students' long-term disaster preparedness knowledge and skills has not been carried out. In addition, the implementation of this book is still limited to the trial stage in a specific learning context, so

its use in various higher education institutions cannot yet be evaluated extensively. Therefore, further research is expected to test the effectiveness of using this book in the learning process more comprehensively and to examine its application in various higher education institutions.

This research focuses on nursing students, but the material presented in this book is essentially general in scope and relevant to various fields of study. Therefore, this book has the potential to be utilized or adapted by other higher education institutions, especially those located in disaster-prone areas, as a learning medium to improve disaster preparedness on campus. In addition, this book can be developed further on a broader scale. In the future, the development of this book can also consider the use of more interactive learning media, such as digital modules and online learning platforms, so that it can reach students from various institutions.

5. CONCLUSIONS

This study concludes that the needs assessment conducted at STIKes Yarsi Pontianak identified the absence of a specific disaster preparedness textbook. Therefore, a comprehensive textbook was developed to enhance nursing students' disaster preparedness knowledge and skills. The draft textbook contains seven main topics based on the results of needs analysis and theoretical studies. It has been validated by experts in terms of content, presentation, appearance, and language, and has been categorized as valid and suitable for use. It has then been revised based on expert input. After revision, the acceptability test results showed good levels of usefulness, ease of use, ease of learning, and satisfaction, indicating that the textbook is ready for implementation. Future research should evaluate the effectiveness of the developed textbook through larger-scale implementation involving nursing students from multiple higher education institutions. In addition, studies should assess its long-term impact on students' disaster preparedness knowledge, attitudes, and practical skills to support wider integration into nursing education curricula.

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