Research Article

Revolutionizing Education: Empowering Disaster Preparedness through Innovative Smart Teaching with e-Modules on FlipCreator Pro Platform

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ABSTRACT

Technology plays an important role to facilitate digital learning including to enhance students' disaster preparedness. Therefore, teachers must be creative particularly for their course design. This study aims to develop smart teaching using e-modules with the FlipCreator Pro platform. We used Research and Development (R&D) with ADDIE model to develop e-modules involving experts and teachers to determine the validation of product. In additon, we measured students' response towards quality of e-modules. Results show that developed e-moduls was adequate to validities, therefore it can be used to collected further data. The module's user-friendly design and practicality make it accessible and beneficial for students, promising improved comprehension and learning outcomes. Future research suggestions include expanding content, adapting for various grades, integrating AI, and conducting wider trials for generalizability. Examining the impact on student learning and teacher involvement is recommended for further exploration.

Keywords : smart teaching; e-module; geography; disaster mitigation

INTRODUCTION

The development of technology and information led many sectors to be required to adapt to digital conditions, including the education sector. This provides convenience for educators and students in the teaching and learning process. Lin & Chen (2017) stated that modern digital-based learning in addition to replacing traditional teaching, it is also alleged to help the application of digital teaching materials and help achieve educational competitiveness. In line with technological developments, the learning and teaching process should be designed to address global issues and global competition (Rahim et al, 2020). Geography learning in schools today tends to use a direct approach (direct instruction), where the teacher as main source of information in learning activities, this causes learning to seem less fun for students (Hasriyanti, 2019). Siskawati et al. (2016) stated that teachers who do not have updated or the latest media cause learning conditions that do not run conducively, this happens due to students were not interested in carrying out the learning process which results in the atmosphere in the classroom becoming noisy or even running passively.

According to Kuswanto (2019), educators have an obligation to create meaningful, fun, creative, dialogical and dynamic education. Learning in the digital era can create all elements in the education unit aware toward the need for online or digital-based learning. Smart teaching is a new term in the world of modern education, it is based on a reference to the development of

technology and information in the field of education. Smart teaching is the process of teachers building a learning environment that is organized in a modern way (Borawska-Kalbarczyk et al, 2019). The concept of smart teaching requires teachers to strive to improve their quality and performance in order to have an impact on improving the quality of education (Salirawati, 2018).

The utilization of technology and information can be implemented by educators using online platforms during learning process. Study from Tekege et al. (2017) showed that information and communication technology provides vast new opportunities, therefore teachers' creativity is crucial aspect particularly to provide new tehnology in education. In addition, ensuring quality of education is crucial particularly using the advancement of current technology (Murni, 2008). Muhamadi & Hasanah (2019) and Syarif et al., (2022) stated that information about flood disaster mitigation remains limited in schools, including lack of understanding regarding public awareness and the early warning system. Therefore, students' knowledge and understanding about natural disasters are crucial, including how to manage its impact.

Initial observations conducted at SMA Negeri 3 Makassar Indonesia showed that teachers and students used printed textbooks only during learning disaster course due to practical reasons, complete material, and has been provided by the local office. However, students showed negative attitude during learning, representing students' low acceptance towards learning methods and media. Therefore, it is necessary to develop learning materials that can elevate disaster mitigation learning. The use of digital platforms is rare in the learning process due to lack of understanding regarding digital platforms (Yang et al., 2021; Wang & Yu, 2022). Gunawan et al (2020); & Ruiz-Rojas et al. (2023) revealed that appropriate online learning during the covid-19 pandemic could be conducted if the learning process utilizes various digital platforms and facilities.

The learning process in the digital era requires the use of textbooks to change to digital (Hadinugrahaningsih et al, 2017). This forces all elements of education to adapt to the reasons for the changing educational paradigm, namely technology-based learning (Hasugian, 2018). On the other hand, Amarulloh at al. (2019) found that student activities are dominated by the use of technology in everyday life, including the learning process. The results of observations also prove that when learning activities take place, the majority of students at SMA Negeri 3 Makassar prefer the internet as a learning resource rather than using printed textbooks. The results of material analysis conducted on one of the printed textbooks showed that the disaster mitigation textbook used still has several deficiencies and errors, indicating the scope of material completeness and repetitive learner activities, while errors are found in inappropriate sentence structures. Such textbooks are less effective and efficient when used for learning in the current era (Yana et al, 2021).

Various platforms are commonly used by geography teachers at SMA Negeri 3 Makassar in the learning process conducted online or online including Zoom, Google Classroom, Google for Education, Moodle, Whatsapp, Email, Youtube, Quipper School and many other platforms. According to the views of geography teachers at SMA Negeri 3 Makassar, some of these applications are indicated to be ineffective regarding disaster mitigation material as a whole because the application has not been able to be comprehensively integrated (images, media, videos, and mapping) related to disaster mitigation material. Therefore, a supporting application is needed to cover all the content needed, so that the effectiveness of learning on disaster mitigation material can be fulfilled. The Smart Teaching approach, utilizing technology and artificial intelligence, effectively enhances student engagement (Chen et al., 2020; Dimitriadou & Lanitis, 2023). By delivering interactive content through applications and online platforms, teachers create a compelling learning experience. Personalized learning, facilitated by artificial intelligence algorithms, allows the adaptation of material to individual student needs, boosting motivation and learning outcomes. The impact is not only evident in increased engagement but also in improved academic achievement and the development of students' skills (Ridsa et al., 2020; Hasriyanti et al., 2022).

This study uses the Flipcreator pro platform as the main application in developing digital modules. Flipcreator is one of the platforms that can load files in the form of animation, text, moving images and can load videos both online and offline (Rahmawati et al, 2024). Study

conducted by Hayati et al. (2015) has proven that the use of flipcreator can improve student learning outcomes. The selection of the Flipcreator pro platform as the main application in the development of disaster mitigation digital modules is based on application tools that are more comprehensive and complete compared to several other applications, making it easier to develop disaster mitigation digital modules.

METHODS

This study used research and development (R&D) method or often referred to as a type of development research. The disaster mitigation digital module on flood material has been developed with the ADDIE model development stages so that the resulting product is of higher quality and educational. This research was conducted from Juny 2023 to September 2023, starting from the preparation of proposals, research to thesis writing. This research was conducted at SMA Negeri 3 Makassar which is located at Jl. Baji Areng No.18, Baji Mappakasunggu, Kec. Mamajang, Makassar City, South Sulawesi.

This study was located at SMA Negeri 3 Makassar using students of class XI IPS 1 as the research subject. Selection of research subjects by considering geography learning that takes place in class XI IPS SMA Negeri 3 Makassar. The test subjects in this study were students in class XI IPS 1 in the 2021/2022 academic year in the even semester at SMA Negeri 3 Makassar, involving 33 students. In addition, the trial also involved Geography subject teachers who taught in the class. The selection of test subjects in class XI IPS 1 refers to the suggestion of Geography subject teacher who recommended the class as a research subject on the grounds that class XI IPS 1 is a class that is also a test subject in digital-based learning for geography subjects at SMA Negeri 3 Makassar launched by the government.

This study used data collection techniques in the form of observations, interviews, and questionnaires. In this study, we used instruments such as digital module development validation sheets by material, media and language experts as well as subject teacher and student response sheets. We analysed a developed product through calculate each indicators' scors that showing validation of product.

The validity is intended to determine whether a learning tools developed meet the validity criteria based on the assessment by expert validation (Khomsiatun & Retnawati, 2015). Ernawati (2017) stated that the results of the experts' assessment will be used as a reference to revise the digital module, resulting in a feasible product. The classification of criteria for the level of feasibility or validation of products (digital modules) is presented in the Table 1.

Table 1. Criteria for Product Feasibility Level (Digital Module)

Percentage (%)	Qualification	Recommendation
61-80	Valid	No Revision Required
41-60	Fairly Valid	Revised
21-40	Less Valid	Revised
0-20	Invalid	Revised

The percentage in the questionnaire on the practicality of digital modules can by analyzed using the Equation 1 (Larson & Farber, 2019) :

$$PR = \sum_{i=1}^{n} Pi \qquad (1)$$

Note :
PR   : practicality score average
Pi   : total of practicality score for each assessment
n   : number of experts

Guidelines for determining the category of practicality of Geography subject teachers and students according to Equation 2 (Widoyoko, 2017):

$$JI = \frac{Smax - Smin}{\sum Ki} \qquad (2)$$

Note :
JI   = Intervals
Smaks   = Ideal maximum score
Smin   = Ideal minimum score
$\sum Ki$ = Interval Classes

The results of the average practicality score obtained has been adjusted to the media criteria, which consist of : (1) If the average score of the practicality of the digital module is categorized as impractical, the media needs to be replaced; (2) If the average score of the practicality of the digital module is categorized as less practical or quite practical, the media needs to be improved; and (3) If the average score of the practicality of the digital module is categorized as practical, or very practical, then there is no need for media improvement.

RESULTS AND DISCUSSION

The validation results of the smart teaching development using digital modules are derived from the application of these modules specifically designed for geography lessons on flood disaster mitigation. The findings underscore the high efficacy of these digital modules in enhancing the learning process. Notably, the positive responses received from both geography teachers and students of class XI IPS 1 at SMA Negeri 3 Makassar serve as compelling evidence of the effectiveness of the implemented digital modules. This positive reception signifies a promising step forward in the integration of technology to enrich the educational experience and underscores the practical utility of smart teaching methodologies in disaster mitigation education.
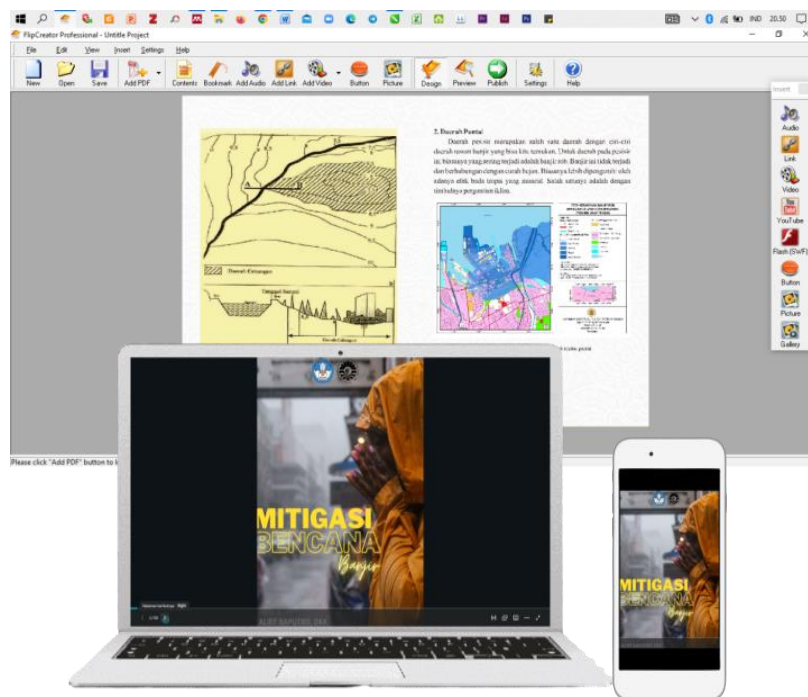

Figure 1. Refinement Process of Digital Module

In Figure 1, it illustrates the refinement process of the developed digital module. In this process, the researcher integrates all utilized components such as images, animations, and instructional videos.
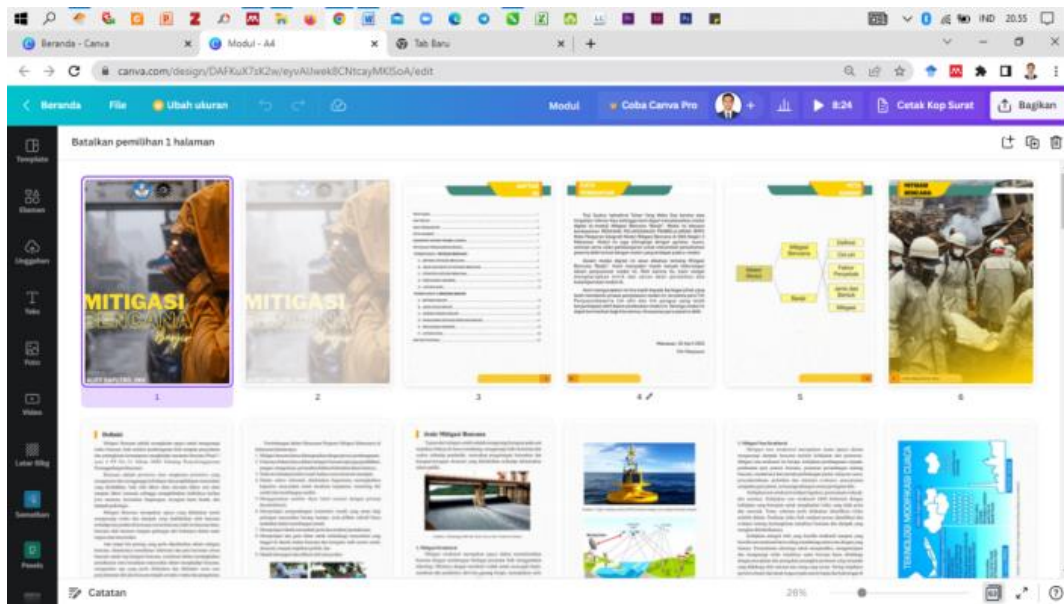

Figure 2. Digital Modules

In Figure 2, it depicts the stages of the percentage process for the digital module. Previously, document exportation was carried out and displayed through Canva as a supporting platform, serving as the medium to showcase the digital module. After undergoing assessment with material validators, the achievement level reaches 93.15%, qualifying as excellent. This success prompts the initiation of testing for the Digital Flood Disaster Mitigation Module. Following evaluation by media validators, an impressive achievement level of 98.33% is attained, signifying an excellent qualification. Consequently, the Digital Flood Disaster Mitigation Module is ready for testing, albeit subject to revisions based on valuable input from media experts. Subsequently, after undergoing evaluation by language validators, the achievement level reaches 96.33%, indicating an excellent qualification. The Flood Disaster Mitigation Digital Module is deemed ready for testing, however with the anticipation of incorporating revisions based on insights from language experts.

In assessing the practicality of employing digital modules through the FlipCreator Pro platform, the current phase involves a comprehensive evaluation to determine the seamless integration of the developed digital module. This critical stage serves as a formative evaluation, primarily focused on garnering valuable feedback from users. This stage aims to assess the digital module, ensuring whether its meet development standarts or not. Teachers filled questionnaires after they used the digital module. Table 2 and Table 3 show results of the response of geography teachers and students to the digital modules.

Table 2. Geography teachers' responses

Statement	Score
The display of digital modules as a learning media	5
The images presented are appropriate	4
Digital modules are capable to deliver a messages for students	4
The animations' appearance	4
Digital modules can elevate students' understanding	4

Table 2 shows the assessment given by the geography subject teacher on the digital module developed with a score of 66, indicating meets the very practical category in accordance with the practicality of digital modules.

Table 3. Students' responses

Student	Score	Student	Score
Student 1	114	Student 18	115
Student 2	118	Student 19	116
Student 3	118	Students 20	118
Student 4	120	Student 21	118
Student 5	117	Student 22	115
Student 6	119	Student 23	115
Student 7	120	Students 24	117

Table 3 shows the assessment given by participants to the digital module developed with a score of 3815 and an average score of 115, indicating very practical category in accordance with criteria of the practicality of digital modules from student assessments. Its in line with studies from Graesser et al., (2023) & Songkram et al. (2023) which found that learning in the second decade of the twenty-first century has distinctive characteristics compared to previous learning. In the previous period, the development of learning in Indonesia experienced many obstacles due to lack of awareness towards technology in education (Sibuea, 2020). Plass & Salisbury (2002) found that technology is an attempt to solve human problems. The application of technology has been very widespread in all sectors, including education sector with various learning innovations (Wong & Cheung 2020; Camacho et al., 2021). Learning activities are requires to involve various interrelated parties which can solve education issues.

Innovative learning creates a dynamic learning atmosphere by involving active learners in every learning process, considering the characteristics of students, environmental conditions and availability of school facilities. Therefore, the best step in learning is combining various methods according to the characteristics of the material, students, educators and facilities (Peters, 2010; Proctor et al., 2020; Teo et al., 2021; Tang & Wang, 2021). Technology could improve learning quality and environment, including elevate students' insight towards disaster material. Its related to interview session, where teacher was impressed towards developed e-modules particularly its led each students directly involved during learning process. This study also found that students were impressed with this e-modules. In the 21st century, conventional learning could not increase learning quality, therefore the advancement of digital-based learning is beneficial to solve education issues (Lasaiba & Lasaiba, 2022; Riantika & Mukminan, 2019).

Our results showed that the use of this digital module is effective to be used in the learning process. The development of this product emphasizes the concept of digitization as a whole, both from design, data collection and evaluation. The development of the digital media greatly affects towards students' attitude and their learning outcome (Efendi, 2018). At the material validation stage, there were 2 experts who directly assess the digital modules developed. They have academics and educational background which focus on geography learning. As a results, these

material was valid, indicating the digital module of flood disaster mitigation could be used for next stages. On another hand, validation results from teacher as a practitioner showed that this developed media also could be valid, indicating its could be implemented to ensrue students' responses. By knowing the level of risk of flood disasters, it can provide an appropriate information to prevent flood disaster earlier (Bongi et al., 2020). At the language validation stage, the digital flood disaster mitigation module was valid, indicating language used is understandable for students as a study by Puspitasari (2017) which found that language should be relevant towards content. Heryanto (2019) found that language validation of the media is important to avoid misunderstanding at developed content.

The digital concept is relevant to media, particularly for such aspects consisting graphic, display and interactive aspects. In the digital module developed, media validators suggest that the digital module can be used in certain times and circumstances as well as the ability of digital modules in understanding the concept of flood disaster mitigation material and building students' knowledge. The digitial module developed received an assessment from the media validator with a very feasible category with revisions. The revisions submitted were in the form of aligning sentences with borders, so that the module arrangement was neatly organized so that module users did not feel bored with the media design, as a study by Hapsari & Zulherman (2021) which showed that through impressive learning media, messages from material to students could be conveyed effectively.

CONCLUSION

The successfully developed digital module, created using FlipCreator Pro as the primary platform alongside supporting tools for smart teaching, represents a noteworthy innovation in digital learning, particularly focused on disaster mitigation. Designed not only for students but also accessible to the general public as a guide in addressing flood disasters, the module demonstrates high validity, as evidenced by assessments from validators in class XI IPS at SMA Negeri 3 Makassar. Material, media, and language validators consistently rated the modules as very valid. Furthermore, the practicality test results categorize the digital module as very practical, indicating that students can easily navigate and benefit from its use. The user-friendly nature of the module is anticipated to enhance student comprehension, facilitating the achievement of learning objectives. For future research, it is recommended to broaden the use of digital modules by incorporating a more extensive range of learning materials. The focus could be on developing modules tailored to various grade levels and subjects. Exploring the integration of AI technology or simulations could enhance the interactivity of the modules. Additionally, conducting broader trials across different schools and educational levels is essential for ensuring the generalizability of the results. A more in-depth understanding of the impact of the modules on student learning and teacher participation in the development and implementation process could be a focal point for upcoming research.

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DECLARATIONS
Conflict of Interest
The authors declared that they had no known competing interests.

Ethical Approval
The research has been approved by the Research Committee of Universitas Negeri Makassar. All research was carried out in accordance with Universitas Negeri Makassar research ethics guidelines applicable when human participants are involved.

Informed Consent
On behalf of all authors, the corresponding author states that all participants have been given informed consent and agreed to take part in this study.

DATA AVAILABILITY
Data used to support the findings of this study are available from the corresponding author upon request.

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