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Developing Flipbook-Based Digital Learning Module for University Learners

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Abstract

The development of digital learning tools has progressed educational practices even though there is a need for engaging and validated resources tailored for university-level instruction. There are many digital modules lack rigorous development and validation, potentially limiting their effectiveness in enhancing learning experiences. This Research and Development (R&D) study aimed to develop a digital learning module in a flipbook format specifically designed for university learners. Utilizing the instructional development model procedure, the research employed both qualitative and quantitative methodologies where qualitative data were gathered through expert validation feedback, while quantitative data were collected via expert validation through questionnaires. This research employed data collection instruments included questionnaires, observation, and interviews. The participants of the study included students from educational study program. The developed digital flipbook module underwent rigorous validation by subject matter, media, and language experts, achieving high validity scores of 100%, 89.13%, and 97.22%, respectively. Furthermore, the module was tested with university learners through individual trials (96.875% validity), small group trials (91.67% validity), and field trials (90.21% validity), all indicating a "very valid" rating for all matters. The consistently high validation scores across expert review and learner trials provide valid evidence that the developed digital flipbook module is a suitable and effective media for enhancing the university learners' learning experience. In conclusion, the findings support the idea that digital flipbook module offer both engaging and validated learning resources for university- level education.

Keywords: Digital Modules; Instructional Development Model; University Education

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INTRODUCTION

Effective learning involves planned, interactive engagement among teachers, students, and all the resources needed in a structured environment to achieve learning goals (Amanullah, 2020). Higher education demands students to be actively, and critically involve in learning activities. University students need to be more creative, independent, and responsible towards their learning. To facilitate this interaction, both teachers and students needs reference materials, known as learning resources in their learning process (Roemintoyo & Budiarto, 2021). Digital learning modules serve as a valuable resource that students can utilize to support

their learning process in higher education context. These modules can provide structured content and interactive elements to enhance the educational experience for learners in general.

A learning module is a independent learning package designed systematically to facilitate student learning experiences in achieving learning goals (Yaumi, 2018). Learning modules possess distinct characteristics compared to other types of learning materials, as outlined by Kosasih at al., who identifies five characteristics of learning modules which are: self-instructional, self-contained, stand-alone, adaptive, and user-friendly (Kosasih et al., 2022). Self-instructional means a learning module is designed so that students can use it for independent learning to regulate their own learning pace. To achieve this, a learning module must contain clear and detailed formulated objectives to present a complete and comprehensive description of the material that aligns with the users' needs, also provide relevant examples and illustrations that include practice questions, assignments, and similar activities that allow students to apply their understanding of the material. The language used also adheres to Indonesian Spelling Guidelines (PUEBI) and is communicative which include a summary of the learning material. This will help the users to make sense of the material since they access it individually. The objective also contain assessment instruments that enable users to measure their level of achievement through self-assessment and provide feedback on the assessment so that users know their level of mastery of the material within the learning module, it is also offer information about references/enrichment/resources that enhance the learning material. The definition of a digital module is a learning resource that is systematically designed based on a specific curriculum and packaged in a specific time unit, displayed using digital platforms (Priatna et al., 2017). With digital modules, learning becomes easier and more practical, which aligns with the research of Maharcika et al., (2021). Based on their data analysis, the average response of teachers and students to electronic modules (e-modules) was 87.19%, falling within the 81%-100% interval, categorized as very practical for teachers to use.

Based on problem identification from lecturers and students, several issues exist in the learning activities for some courses in university related to learning materials. One of them is students experience difficulties in finding learning materials, both books and articles that they can use for their learning. Finding appropriate learning materials for the Program Evaluation course is also difficult due to the limited number of Indonesian books for their resources. The reflection results conducted after the class in every meeting showed that more than 40% of the students experienced this problem. Most available resources are in English, necessitating good English skills to understand them. This significantly impacts the information processing of students, leading to discrepancies in initial information and causing learning activities to be unconducive and incomprehensible. It is on this basis that the researcher intends to solve the learning problems experienced by students in the Educational Technology Study Program regarding the limited availability of learning materials that can cover the entire learning content and are integrated with technologyin most of the courses in university. The objective of this study is to develop a learning material in the form of an interactive flipbook-based

digital learning module for students to enhance the quality of learning in university setting.

Some studies showed that digital learning modules promotes learning (Aan Anisah et al., 2023; Abiddin et al., 2022; Mulyaningsih & Saraswati, 2017; Suryani et al., 2020; Uswatun & Kurniati, 2024; Yeni Nurhasanah et al., 2022), engagement (Isnaeni & Agustina, 2018) and critical thinking (Prasetyono & Sigitta Hariyono, 2020; Rahmatullah et al., 2025). Suryani et al., (2020) stated that digital learning modules make it easier for students to understand learning material. In addition, Mulyaningsih & Saraswati, (2017) stated that the use of digital books with Kvisoft Flipbook Maker has a significant influence on improving students' conceptual understanding and learning outcomes. Several researches indicate that digital flipbook-formatted books positively influence the quality of the learning process and enhance student learning experiences. Isnaeni & Agustina, (2018) found that digital material can elevate students' engagement and understanding to enhance better educational results. Furthermore, integrating flipbook with website support can enhance students' mathematical logical reasoning abilities. This combination of interactive digital content and online resources offers a promising approach to developing critical thinking skills for students (Prasetyono & Sigitta Hariyono, 2020).

This interactive digital flipbook module was created to address the issue of limited learning materials that have previously encountered during educational process of Program Evaluation course. The study employed Dick, W, Lou, C, Carey, (2005) developmental framework. The framework guides the development of the module, starting with identifying learning needs and broad objectives, followed by analyzing student profiles and the learning content. Subsequent steps include defining specific learning goals, creating assessment tools, planning teaching methods, producing learning materials, designing and evaluating the module iteratively, and implementing the system. For the final stage, summative evaluation and adopting the module in university learning setting was done. This study was guided by the following research questions: 1. What are the features of the digital module? 2. What are the validation processes involved? 3. How is the iterative processes conducted?

METHODS

The subjects in this research are 6th-semester students of the Educational Technology study program at the Faculty of Teacher Training and Education of one university in Bogor. The students' age range between 19-30 years. They have been exposed to educational technologies and trained to use them during their study from the first to the fourth semesters. It means that the students have educational technological background knowledge. They also have access to some technological tools available in laboratotium that they use for their learning processes.

The type of research used is Research and Development (R&D), which is defined as research used to produce a specific product and test the effectiveness of that product (Dick, W, Lou, C, Carey, 2005). There were linear and iterative stages in this model. In the linear stage, problems, needs, and existing solutions were

identified by reviewing the existing literatures, conducting surveys, and analyzing available modules. Once the analysis was completed, module scope, objective, and design were created. In the iterative stage, the module prototype was developed, which was validated by experts and tested to small scale group. Based on the result of evaluation of small testing, the module was revised. The revised module was tested on the real world classroom and final adjustments were made based on the test results.

The experts in the validation covers material's expert, media expert, and language expert. These experts were given module created and the instrument to validate the module. The instruments were adopted from some sources (Chávez Arcega, 2010; Glaser, 1963; Smaldino, Sharon E. Lowther, 2019).

To report the whole process, descriptive qualitative and quantitative method (mixed method) was used in the study. It is an approach that involves qualitative and quantitative data in responding to research questions or hypotheses (Creswell, 2013). Qualitative data were analyzed by examining lecturer interview transcripts, summarizing student responses from the initial assessment of their behaviors and characteristics, and reviewing verbal feedback from expert validators. Observation data on student reactions was also undergone qualitative analysis. For the quantitative data, descriptive statistics were used to analyze the aggregated Likert scale scores from expert validation questionnaires and student testing.

The intended outcome of the interactive digital learning module in flipbook format for the Program Evaluation course is to createa digital module that is accessible through a web link or barcode. This module include: a title, guidance for students, a competency overview with relevant technology for each section, text-based content enhanced with visuals and videos, real-world examples, helpful learning tips, and practice exercises to improve student competency. The upcoming digital learning module present written content enhanced by relevant visuals and videos to elevate student engagement in university setting. Key terms are highlighted in each section, alongside helpful tips to spark curiosity of the students in learning process. To foster self-directed learning, each unit features assignments and exercises for independent reflection. Moreover, real-world examples are integrated to help students apply their knowledge to everyday contexts and daily life. Videos are accessible via direct links within the module as additional information to the course.

RESULTS & DISCUSSION

The research and development of the flipbook-based digital learning module yielded several key discussion points. Firstly, the overall features of this digital module as a learning tool were assessed. Secondly, the validation process involved feedback from material, media, and language experts, each providing developing comments on the product. Finally, the module underwent iterative testing through one-to-one, small group, and field trials, with each stage informing revisions and contributing to the final evaluation of its effectiveness and usability for learners. These stages collectively provide a comprehensive understanding of the module's

development and validation of the product to test the readiness of the product to be use in university settings.

General view on flipbook-based digital learning module

The module was created using B5 paper (176 x 250 mm). Color choices were based on student preferences, with 82.8% favoring soft pastels, leading to a light grayish orange base with very dark magenta and soft orange accents. Image selection combined real photographs (preferred by 58.6%) and illustrations (favored by 41.1% of the students). The module underwent validation by content, media, and language experts via questionnaires, followed by individual, small group, and field testing with 6th-semester students. The flipbook can be accessed through https://tinyurl.com/ModulEvaluasiProgram . These are some features and interface of the flipbook:

Figure 1. Flipbook cover

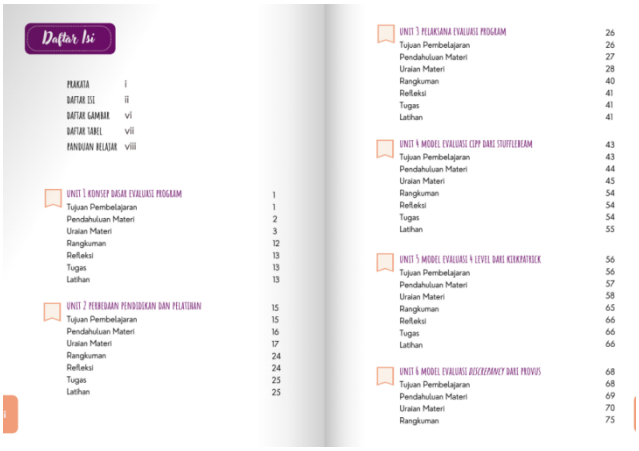

Figure 2. Feature in Flipbook

Validation result of material expert

The material expert validation survey yielded a perfect 100% score (76 points), classifying the module as "*very valid.*". Nevertheless, the expert recommended refinements of the product, including distinguishing material indicators for the fourteenth and fifteenth sessions and increasing video audio levels in the video is needed. Additionally, providing an offline version with a barcode to replicate interactive features was suggested to improve user experiences in accessing flipbook. Consequently, the initial module's material quality was deemed "very valid with suggestions for improvement."

Validation result of media expert

The media expert evaluation yielded an 89.13% score (82 points), categorizing the module as "very valid.", however, some aspects received lower ratings than others. Specifically, video quality was rated poorly (score of two) due to unclear audio, the sound of the flipbook is not too good that it is difficult to comprehend the material in the video. Link accessibility also scored poorly (two) as it relied on a stable internet connection, causing potential interruptions, strong internet connection is needed to access the material. Regarding to Font style and

size, along with image quality, received a "good" rating (score of three), though adjustments were suggested for readability and image clarity, so that the reader will read the material easily. The image quality received a "good" rating (three) despite some images being of lower quality, furthermore, the expert offered several comments and recommendations to enhance the product. The media expert recommended correcting writing errors, varying the difficulty of answer choices using action verbs (C1-C6), and ensuring both online and offline accessibility to ensure the material accessibility. Suggestions included proofreading, adding internal links in the table of contents and unit beginnings, improving audio narration clarity and volume, and verifying ease of access in both online and offline. Thus, the initial product was deemed "very valid with suggestions for improvement."

Validation result of language expert

The language expert assessment resulted in a 97.22% score (35 points), also indicating "very valid." However, one aspect was rated "good" (score of three) due to non-standard language usage in the module's writing that might lead to informality. Consequently, editing and reviewing the language is necessary to enhance the overall quality of the digital learning module. Furthermore, the language expert offered several comments and suggestions to improve the module's quality in term of language use. They noted the module was well-done written, with clear and grammatically correct language, pointing out only minor punctuation issues that can be revised in no time. Recommendations included correcting the word choice from "perancang" to "perancangan," fixing spacing errors before punctuation (except when necessary), and using consistent Indonesian terminology for optimal clarity for the reader to digest the information. Consequently, the initial module's language quality was judged "very valid with suggestions for improvement."

The results of revised flipbook product trials on students

The revised product by the researcher then underwent *one-to-one trials* with three 6th-semester students from higher education. Based on the results of the questionnaire assessment, an overall score percentage of 96.875% was obtained, which falls into the "very valid" category. There were no specific comments or suggestions provided by the students; they felt that the learning module was in line with their expectations and was able to pique their interest in learning the material presented within it. In addition to the questionnaire-based assessment, the researcher also supplemented the research data by conducting observations, using an observation guide for students during the product trials. The observation results showed a high level of positive students responses, but there were some notes for improvement that the researcher needs to make to enhance the product quality, including: simplifying product navigation; streamlining the use of links and linked page windows; and rechecking the functionality of the links within the learning module. Based on the results of the questionnaire assessment and observations conducted by the researcher, the product validation level reached 96.87very valid5%, which falls into the "very valid with suggestions for improvement" category, thus obtaining a "suitable for use" predicate.

Other than *one to one trial,* the revised product by the researcher then underwent s*mall group trials* with nine 6th-semester students. Based on the questionnaire assessment, an overall score percentage of 91.67% was obtained, which falls into the "very valid" category. Students stated that the learning module was very good, with the only comment being that the audio quality in the video was not good enough, thus requiring improvement of the audio quality within the video. In addition to the questionnaire assessment, the researcher also supplemented the research data by conducting observations. The observation results showed a high level of positive student response, and the previous issues encountered during the individual trials had been well resolved. There was a comment stating that the video audio quality in the learning module was still not good enough, so improvement of the audio used in the video is needed to refine the learning module. Based on the results of the questionnaire assessment and observations conducted by the researcher, the product validation level reached 91.67%, which falls into the "very valid with suggestions for improvement" category, thus obtaining a "suitable for use" predicate.

In addition to the 2 trials above, last trial was conducted to the revised product by the researcher then underwent *field trials* with thirty 6th-semester students. Based on the questionnaire assessment, an overall score percentage of 90.21% was obtained, which falls into the "very valid" category. Students stated that the learning module was very good. The comments given by the students included: there were still some errors in word writing; the use of signs should be reduced, with signs used only to highlight important terms; and reconsider the font usage for students with myopia. In addition to the questionnaire assessment, the researcher also supplemented the research data by conducting observations. The observation results showed a high level of positive student response, and the previous issues had been well resolved. There were comments that word writing still had spelling errors and also regarding font size adjustments. Based on the results of the questionnaire assessment and observations conducted by the researcher, the product validation level reached 90.21%, which falls into the "very valid with revisions" category, thus obtaining a "suitable for use" predicate.

CONCLUSION

The feasibility testing of the interactive flipbook-based digital learning module was conducted through expert validation involving three experts: a material expert, a media expert, and a language expert, as well as various product trials range from: individual trials (one-to-one), small group trials, and field trials. The material expert validation yielded a validation percentage of 100%, the media expert yielded 89.13%, and the language expert yielded 97.22%, resulting in an average expert validation of (100% + 89.13% + 97.22%) / 3 = 95.45%. Each expert provided several comments and suggestions for improvement, which the researcher followed up on by revising the product before product trials.

The individual trials yielded a percentage of 96.875%, the small group trials yielded 91.67%, and the field trials yielded 90.21%. Across each stage of revised product trials, there were several comments, suggestions for improvement, and subsequent observation results that indicated some errors and shortcomings of the product. To improve the product quality, the researcher followed up on these points by revising the product. Therefore, based on the results of the expert validation, individual trials, small group trials, and field trials, it can be concluded that the

interactive flipbook-based digital learning module for the university students that was developed is considered suitable for use in the learning process in university setting.

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