Al-Ishlah: Jurnal Pendidikan
Vol.16, 3 (September, 2024), pp. 3380-3388
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v16i3. 4751

Development of Flipbook-Based E-Module to Improve Students' Learning Outcomes in Basketball Course

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ARTICLE INFO

Keywords:

Flipbook-Based E-Module;
Student Learning Outcomes;
Basketball Course Education;
Multimedia Learning Tools Development

Article history:

Received 2023-11-30
Revised 2024-01-18
Accepted 2024-09-29

ABSTRACT

Limited learning resources for integrating theory and practice in e-module-based physical education, particularly in basketball, present challenges in enhancing student learning outcomes. This study addresses the development and assessment of multimedia-based basketball teaching materials aimed at improving students' understanding and performance in sports education. This research employed a Research and Development (R&D) approach with a quantitative design. The developed multimedia basketball game application was evaluated by experts, including basketball coaches and university lecturers from Medan State University, to assess its suitability as a teaching resource. The evaluation process involved both content and media experts. The assessment by basketball learning material experts yielded a score of 87.52%, indicating the application is highly suitable for use in educational settings. Media experts provided a score of 89.70%, further affirming the multimedia basketball application's effectiveness as a teaching tool. Both evaluations reflect the application's potential to bridge the gap between theory and practice in basketball education. The findings suggest that the multimedia basketball game application is a viable tool for enhancing basketball education. Its implementation can improve the quality of teaching, support lecturers in delivering complex content, and ultimately enhance students' learning outcomes in sports science. The development of a multimedia-based e-module for basketball is a significant step towards improving the resources available for physical education. The application has been validated by experts and can be effectively integrated into the curriculum to enhance learning in basketball courses.

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1. INTRODUCTION

Education plays a crucial role in shaping individuals' attitudes and behaviors within the family, community, and government through formal and informal learning processes such as guidance, counseling, and training (Atho'illah, Kartono, & Masrukan, 2022). In this context, educators hold a vital responsibility in facilitating these educational activities, which are inherently interdependent (Zainuddin & Perera, 2018). The effectiveness of teaching and learning is significantly influenced by the educators'

ability to align teaching methods with competency objectives, ensuring that the content is delivered effectively and comprehensively understood by students. To meet these demands, educators must adapt to contemporary teaching approaches, including the use of e-modules to enhance the learning experience (Filiz & Benzet, 2018). Medan State University (UNIMED), as a higher education institution, is committed to producing graduates who are skilled, professional, and capable of responding to societal changes through innovation and knowledge dissemination (Abedi, Keshmirshekan, & Namaziandost, 2019). Among its seven faculties, the Faculty of Sports Sciences (FIK) is dedicated to advancing the quality of sports education, including through the development of tools such as flipbook-based e-modules to improve students' learning outcomes in specialized courses like basketball.

Education plays a crucial role in the advancement of a nation by producing high-quality human resources. It is a deliberate effort to develop students' potential, enabling them to acquire intelligence in areas such as knowledge, skills, and positive attitudes. Continuous curriculum development is undertaken to enhance the quality of education in Indonesia. The global coronavirus pandemic has affected nearly all aspects of life, including education. Lecturers and teachers are now required to deliver content using various online learning platforms (Turan & Akdag-Cimen, 2020). One of the most significant challenges for lecturers responsible for practicum courses is the difficulty in tracking students' progress in skill development, practical training, and match simulations in basketball education. Multimedia basketball applications designed for beginners can assist in teaching fundamental basketball techniques, serving as a valuable resource for coaches and individuals new to the sport. These tools encourage active, creative, innovative, and independent learning, and they also enhance the effectiveness of understanding referee signals for novice basketball players (Safiyeh & Farrah, 2020).

According to Winkel (as cited in Trisnawati, 2019), a learning module represents the smallest unit of the teaching and learning process, designed to structure education and facilitate individualized instruction. An e-module, or electronic module, is a form of teaching material adapted to the specific characteristics of the subject matter, organized in a complete and sequential format, and intended for independent study (Fauzi, Irawati, & Aeni, 2022). This format allows students to engage actively with the material at their own pace, fostering a more autonomous learning experience without direct interference from teachers or other students. The use of e-modules is expected to promote students' interest in learning, thereby enhancing their motivation and engagement in the educational process (Abdullah, Hussin, & Ismail, 2019). As Pitnawati and Damrah (2019) highlight, the development of physical education, sports, and health learning should be designed to create meaningful experiences that engage students both mentally and physically through interactions with teachers, peers, the environment, and other learning resources. Additionally, Purwaningtyas (2017) emphasizes that the development of such educational tools should focus on improving products to meet the evolving needs of learners. In conclusion, e-modules offer a promising approach to fostering independent, engaging, and flexible learning, particularly in the context of physical education and sports.

Research and development (R&D) aims to create new products and evaluate their effectiveness, as Kurniawan (2018) noted. Dwiyogo, as cited in Purwaningtyas (2017), conducted research focused on developing online-based electronic modules for Physical Education, Sports, and Health (PJOK) subjects using the Edmodo platform. This study centered on a blended learning design to enhance problem-solving skills in education. The steps involved in this development process included analyzing problem-solving needs, identifying learning resources and obstacles in blended learning, understanding learner characteristics, setting educational goals, organizing content, implementing educational strategies, conducting feasibility tests, making improvements, and developing educational prototypes. In the context of PJOK, basketball is one of the key subjects taught, requiring both theoretical knowledge and practical skills (Yaroslavova, Kolegova, & Stavtseva, 2020). The learning process for basketball necessitates creativity from educators to effectively balance teaching theory and practice within limited timeframes. If either the theoretical or practical aspects are not clearly communicated, it can significantly impact students' understanding of specific movements. As science and technology continue to advance, it is

essential for educators to adapt to these changes and integrate them into the learning process (Aburezeq, 2020).

Lecturers and teachers are required to deliver educational materials using various online learning applications (T.T.T., Quyen & N.V., 2018). A significant challenge faced by lecturers in practicum courses is the difficulty in monitoring students' progress in developing their abilities and understanding of basketball practice and regulating match rules in specific sports (Sari, Anggoro, & Sugiharta, 2020). This issue is particularly evident in basketball courses, where one of the core competencies is for students to be able to teach or coach by delivering material and organizing basketball matches. In response to these challenges, researchers advocate for the use of technology-based application media as a platform for students to develop their competencies without the need for face-to-face interaction or on-field match simulations (Pratidiana, Pujiastuti, & Santosa, 2022). The integration of technology, through the development of application-based basketball teaching materials—comprising instructional videos and learning content accessible both online and offline via Android applications—serves as a medium for students to enhance their competencies (Pangesti, Nopriansyah, & Fatonah, 2021), allowing them to build skills and knowledge without the necessity of in-person meetings.

One type of learning media that can foster an engaging and conducive learning environment is the use of multimedia application-based teaching materials (Du, 2020). According to Mulyadi (2016:297), utilizing multimedia applications can enhance students' creative thinking and positively impact their learning outcomes. Learning outcomes refer to the process individuals undergo to achieve new behavioral changes, which result from their own experiences interacting with their environment (Adnyani, 2017:80). These outcomes are reflected in the form of scores that students receive after taking assessments at the end of a lesson, mid-semester, or the end of a semester (Arifani, Asari, Anwar, & Budianto, 2020). A multimedia application such as a flipbook consists of a series of images arranged to create the illusion of movement, forming simple animations within a small book without the need for machinery (Savitri & Meilana, 2022). However, modern flipbooks have evolved into digital books, which can be opened and read on a computer screen. Rasiman (2014:536) explains that students show greater interest in learning activities that incorporate flipbooks (Ulya, Isnarto, Rochmad, & Wardono, 2019).

The study about the developed e-module focuses on physical fitness through play-based activities (Putra et al., 2020). These activities naturally include elements of dance, which capture students' attention and promote active participation in the learning process. According to Gusril (2016), play activities offer both physical rejuvenation and psychological enjoyment, helping students engage in movement-based tasks without becoming fatigued. The use of a flipbook application enhances the appeal of the teaching materials by allowing each page to be opened digitally, creating a dynamic and interactive learning experience (Anggo & Samparadja, 2022). In conclusion, the integration of play-based activities and dynamic digital tools such as flipbooks can significantly improve student engagement and make the learning process more enjoyable and effective.

Despite the growing integration of technology into education, there remains a gap in the availability of effective multimedia resources that can bridge the theoretical and practical aspects of basketball education, particularly within the context of e-modules. Existing studies on blended learning and multimedia applications have addressed various subjects but have not adequately explored the specific needs of sports education, especially in basketball, which requires a balance of both physical and cognitive engagement. This research aims to address this gap by developing and assessing a flipbook-based e-module designed to enhance learning outcomes in basketball courses. The primary research questions guiding this study are: (1) How effective is the flipbook-based e-module in improving students' theoretical understanding and practical skills in basketball? and (2) What are the students' perceptions of the usability and impact of the e-module on their learning experience? The objective of this research is to develop a functional, interactive, and user-friendly e-module that enhances both theoretical knowledge and practical skills in basketball, providing a comprehensive learning tool for students. The novelty of this research lies in the combination of multimedia and sports education to create a dynamic, engaging, and accessible learning experience, tailored to meet the needs of modern education. This research is

important as it offers a new approach to addressing the challenges of teaching basketball, especially in remote or blended learning environments, and contributes to the advancement of sports education pedagogy.

2. METHODS

This research employs the Research and Development (R&D) methodology to develop multimedia applications, specifically using the ADDIE model. R&D is a research approach designed to produce new products and assess their feasibility and effectiveness (Novitasari, 2019). In this study, the researchers aimed to develop a flipbook-based multimedia application for educational purposes and evaluate both its feasibility and validity. It follows a structured development process that includes five stages: analysis, design, development, implementation, and evaluation (Purnama, 2016). These stages ensure that the product is systematically developed and rigorously tested for its effectiveness in the learning process (Andriyani, 2019).

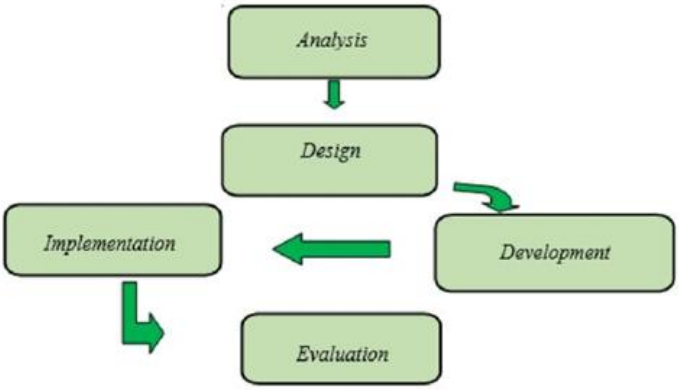

Figure 1. Research and Development (R&D) Model Design

However, to increase the validity and generalizability of the research results, the study expand the scope of its trials to include a broader student population from various universities or educational institutions. By conducting the trials across different demographics and educational contexts, the researchers can gather more comprehensive data, allowing for a better understanding of how the flipbook-based multimedia application performs in different learning environments. This expansion will also enable the researchers to test the module's effectiveness across a wider variety of students, potentially increasing its applicability to diverse educational settings (Mertens, 2020).

The research method also integrates the ADDIE model, which is commonly used in educational product development. The ADDIE model consists of five key phases: Analysis, where the researchers identify the problem and needs; Design, where the framework for the multimedia application is created; Development, which involves creating the actual product; Implementation, where the product is introduced into the learning environment; and Evaluation, which assesses its effectiveness and guides further revisions (Muhubiddin, 2015). To enhance the reliability of this study, future trials should focus on a more diverse and larger sample size, increasing the accuracy of the product's evaluation in various educational contexts.

In this study, a validation test was conducted during the product trial phase to identify any errors or areas for improvement. The product was reviewed by a panel of experts, including basketball subject matter experts, media and design experts, and language specialists, ensuring that the content, design, and delivery are accurate, engaging, and suitable for educational use (Sismahendra, Rusdiana, & Yudiana, 2020). Expanding the validation process to include experts from other educational institutions will also help capture a broader perspective, enhancing the product's versatility. The feedback from these

validators informs necessary revisions, ensuring that the final product meets high standards of educational quality, usability, and applicability across various student populations.

By conducting trials on a wider scale and involving multiple educational institutions, this study will yield more generalizable results, providing greater insight into the effectiveness of the flipbook-based multimedia application in improving student learning outcomes, particularly in basketball education.

3. FINDINGS AND DISCUSSION

The development of the multimedia application for basketball courses followed a structured process aimed at improving learning outcomes in basketball through the use of digital teaching tools. After conducting a needs analysis and gathering relevant information, the general framework for the multimedia-based teaching materials was created to aid students in understanding basketball techniques and game management, ultimately enhancing the learning experience in sports science (Konapure & Lobo, 2021). The data collected consisted of both qualitative and quantitative measures. Qualitative data was expressed in narrative form, while quantitative data was generated by assigning scores to the qualitative responses.

The instruments utilized in the study included a needs analysis questionnaire and evaluation questionnaires from IT experts and physical education media specialists. Data analysis was performed using descriptive statistical techniques, with the results from product trials being presented as percentages. The evaluation process involved expert assessments of the basketball multimedia application, including input from coaches and lecturers specializing in basketball courses at Medan State University. The primary objective was to validate the teaching materials and identify potential areas for improvement (Husain, 2020).

The results of the assessment from basketball learning material experts indicated a high level of suitability, with an overall score of 87.52%, categorizing the product as "very feasible" for use in basketball courses (Astuti et al., 2022). Additionally, media experts provided an overall assessment score of 89.70%, further validating the effectiveness and feasibility of the multimedia application. These evaluations contributed to the revision process, where adjustments were made based on expert feedback to enhance the quality of the teaching materials.

The expert validation process yielded an overall material expert validation score of 86.50%, categorizing the product as "very feasible." Similarly, media expert validation achieved a score of 90.67%, confirming that the multimedia teaching materials were highly suitable for use in educational settings. The combined results from both basketball learning material experts and media experts produced an overall percentage of 89.44%, indicating that the product is "very feasible" for incorporation into the basketball learning process (Liu, 2021).

Table 1. Table: Expert Validation Results of Multimedia Basketball Application

Expert Group	Validation Score (%)	Feasibility Category
Basketball Learning Material Experts	87.52%	Very Feasible
Media Experts	89.70%	Very Feasible
Material Expert Validators	86.50%	Very Feasible
Media Expert Validators	90.67%	Very Feasible
Overall Average	89.44%	Very Feasible

The results from the expert validations indicate that the multimedia-based basketball teaching materials developed in this study are highly feasible for use in the learning process. These findings support the integration of multimedia applications into sports education to enhance student engagement and learning outcomes.

The aim of this research is to enhance learning outcomes in basketball courses through the development of multimedia applications, specifically designed to support sports science education, with a focus on basketball. While significant progress has been made, further development is needed, particularly in expanding the content to ensure that it fully aligns with the curriculum and provides comprehensive coverage of the subject matter. The next phase of development will involve refining the material and testing the final product to evaluate its effectiveness in improving the quality of basketball instruction and learning outcomes (Siregar, Faridah, & Hasibuan, 2023).

Discussion

The development of this E-Module aims to create a learning medium that can facilitate the teaching and learning process in the classroom, thereby attracting more students' attention and motivating them to engage with the material using the E-Module. Digital learning media, as demonstrated by various studies, have great potential to enhance student engagement and support the achievement of learning objectives (Pratama, Sumarni, Safaruddin, & Iyakrus, 2021). This E-Module is expected to help students easily understand the material, as it is equipped with instructional videos that explain each concept clearly and are accessible anytime and anywhere (Zarwan, 2022). Consequently, the E-Module provides an effective solution to address the limitations of learning resources in physical education, sports, and health, particularly in basketball instruction (Amorim et al., 2022; Nugroho et al., 2022).

According to Suarsana and Mahayukti (2013, as cited in Sugihartini & Jayanta, 2021), E-Modules are an adaptation of printed modules into a digital format, integrating various media such as text, images, animation, video, and audio for use in the teaching and learning process. This aligns with the findings of this study, where the *flipbook*-based E-Module allows students to study independently, particularly during the pandemic and the new normal, which have encouraged more remote learning (Purwaningtyas & Damrah, 2019). The use of interactive multimedia has been proven to enhance students' understanding of material, especially in basketball, which includes learning outcomes such as dribbling, shooting, and passing (Ahmadi, 2007).

Although the validation results indicate that this flipbook-based E-Module is highly feasible for use, with high validation scores from content and media experts (89.44%), the discussion lacks depth in explaining how the module directly impacts students' practical skills. For instance, while the E-Module may help improve theoretical understanding, there is no strong empirical evidence demonstrating its effect on students' physical abilities or practical performance, such as in skill assessments or practical exams.

To address this gap, further research should focus on testing the module's impact on students' practical learning outcomes. A quasi-experimental study with control and experimental groups could be employed to measure whether the module significantly improves students' basketball skills in a practical learning context (Huang et al., 2019). This research should also include assessments of students' physical skills, such as dribbling, shooting, and passing tests, to obtain more comprehensive data on the module's effectiveness in practical aspects (Putra et al., 2020).

Additionally, future development of the module could incorporate interactive features such as augmented reality or virtual simulations, which would provide a more immersive learning experience and enable students to practice basketball skills in a digital environment (Akçayır & Akçayır, 2017). Further research should also involve participants from various institutions to enhance the generalizability of the findings and expand the module's application in different sports education contexts.

4. CONCLUSION

The development of multimedia-based basketball teaching materials demonstrated positive results in enhancing both theoretical understanding and practical skills in basketball courses. The approach, which included needs analysis, expert evaluations, and revisions, resulted in a highly feasible digital tool, validated by experts with an average score of 89.44%. However, the study had limitations, such as the scope of content, which may not cover all aspects of the basketball curriculum,

and the lack of real-time interactive simulations for a more immersive experience. The research was also limited to a small participant group from one university, which may affect the generalizability of the results. Additionally, the long-term impact of the multimedia application on learning outcomes was not assessed. Future research should expand the content to include a wider range of basketball techniques, incorporate interactive features like augmented reality, and involve a larger, more diverse sample of students. Longitudinal studies would also help evaluate the long-term effectiveness of the application in improving basketball skills and learning outcomes.

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