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Improving volleyball competence: E-module-based volleyball learning media innovation

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ABSTRACT

The urgent need for the creation of cutting-edge learning media in the context of volleyball learning served as the driving force behind this study. The main objective was to develop and validate the E-Module as an innovative learning tool specifically focused on skill development in volleyball. The research method applied was the development method with the ADDIE approach (Analysis, Design, Development, Implementation, and Evaluation). Data collection was done through questionnaires and documentation, while data analysis used quantitative descriptive techniques. The results showed that E-Module as an innovative learning tool in volleyball can be developed successfully. This finding highlighted the important role of experts in the development of e-modules and opened up new insights into the potential of technology in supporting the learning of sport practices, especially in the context of volleyball. While the results of this study showed a positive impact, there are limitations in the context and sample of the study. Therefore, further research is needed to explore the impact of student motivation on the use of the E-Module in volleyball learning as well as generalise these findings to other sport learning contexts. This E-Module can not only be a reference for further research in the field of sports learning media development, especially volleyball, but also be recognised as an excellent product of E-Module-Based Volleyball Learning. Thus, this research contributes not only to academic knowledge but also to the practice of sports learning, especially volleyball.

Keywords: E-modules; learning media; volleyball

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INTRODUCTION

The development of information and communication technology has had a significant impact on various aspects of life, including education. In recent years, online learning, or e-learning, has become an integral part of education systems around the world (Tan, 2019). This technology not only facilitates access to information and learning resources but also supports more flexible and personalised learning methods (Li & Wong, 2019, 2021). In addition, e-learning can also help in increasing students' engagement in the teaching-learning process (Dubey et al., 2023; El-Sabagh, 2021; Rajabalee & Santally, 2021).

In the context of physical education, such as sports, e-learning technology has also opened up vast opportunities (Çelik, 2020). One sport that has benefited from these developments is volleyball. Volleyball is a popular sport among students and university students (Ismailova, 2022; Özgül et al., 2019), but it is often difficult to integrate volleyball lessons into an online learning environment (Fani & Sukoco, 2019; Kaden, 2020; Samsuddin et al., 2022). In this situation, the development of e-module-based teaching media is an interesting solution. This teaching medium can allow students to learn in a more interactive and fun way (Astalini et al., 2019; Darmaji et al., 2022).

E-Modules have the potential to change the way students learn and practice (Erianti et al., 2022; Rosmawati et al., 2022). In contrast to conventional teaching methods, E-Modules allow students to access learning materials and resources anytime and anywhere (Afriyanti et al., 2021; Sidiq & Suhendro, 2021). In addition to the accessibility advantage, E-Modules can also make learning about sports techniques more visual and easier to understand (Batubara et al., 2022; Gumara et al., 2023). This is very beneficial, especially in sports such as volleyball that require a good understanding of techniques (Boichuk et al., 2017).

In addition to the benefits already outlined, the use of e-modules also creates greater collaboration opportunities between students and instructors (Asrial et al., 2019; Townley et al., 2023). Through online platforms, students can communicate with instructors, collaborate with fellow students, and share their experiences and views (DiVerniero & Hosek, 2011; Tian, 2020). This creates a dynamic and interactive learning environment that cannot always be achieved in conventional teaching. Thus, e-modules can help in building a strong learning community among volleyball enthusiasts, which can contribute to the overall growth and development of the sport.

Overall, the use of e-module-based teaching media in sports education, particularly volleyball, promises a major change in learning and training approaches. By overcoming access constraints, providing a more comprehensive learning approach, and facilitating active collaboration, e-modules have great potential for improving students' understanding and skills in playing volleyball. In addition, e-modules also have positive impacts on expanding the reach of sports education (Velan et al., 2015), presenting more inclusive and affordable learning opportunities for many (Çelik, 2020; Habibi et al., 2022).

Although previous research has explored the development of e-modules for volleyball learning (Alfani et al., 2023; Subakty etal., 2022). However, these studies mainly focused on the scope of physical education at the school level. Meanwhile, this study makes a unique contribution by focusing on the development of e-module-based teaching media specifically for university students. This is relevant because university students have different learning characteristics from students in schools and require a customised approach (Li & Wong, 2021). In addition, the physical education curriculum itself is often difficult to develop due to a lack of research on the systematisation of effective lessons and activities (Cruz et al., 2021). This research aimed to fill this gap by presenting an innovative method of creating teaching modules.

It is also important to note that, amidst the current dominance of distance learning, the relevance of innovative teaching media is increasing. As pointed out by Rosmawati et al. (2022) in their research on designing cybergogy-based e-modules, adaptation to new technologies and teaching methods has become crucial. Therefore, this research not only makes a new contribution to the realm of sports education but also responds to the challenges and complexities faced in the current era of online learning. This research specifically focused on the development of e-module-based learning media for volleyball subjects, aimed at physical education students.

METHOD

The Research and Development (R&D) model is used in this study. It incorporated the ADDIE concept for the systematic and effective design of teaching materials in both traditional and digital formats (Martatiyana et al., 2023). Researchers in various educational settings have largely adopted the ADDIE model, which is well-known for its comprehensive approach (Afif et al., 2023; Nor et al., 2023). To improve the robustness and quality of the developed teaching materials, the validation process is integrated into each stage of the ADDIE model.

The validation process ensures that the materials fulfil their requirements and objectives (Yulia et al., 2023). The involvement of skilled and experienced validators at each stage of the ADDIE model contributes to the validity and overall quality of the educational materials. Three validators were used in this study, namely material experts, learning media experts, and linguists. The expertise of these experts is crucial in assessing the quality and suitability of the materials (Lestari et al., 2023). Their evaluations and feedback help refine and improve the materials, making them more effective for teaching and learning (Sulaeman et al., 2022).

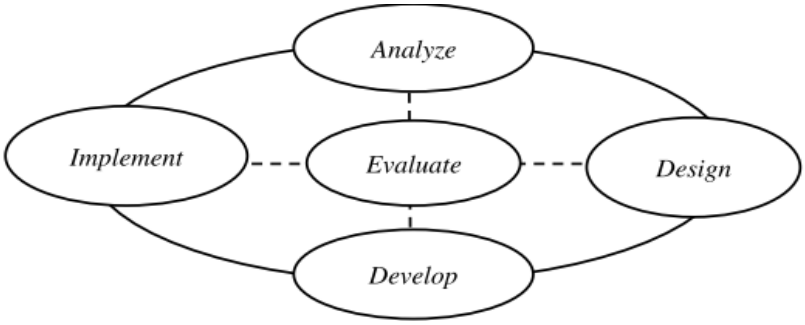

Figure 1. ADDIE Model Concept
(Gustafson & Branch, 1997)

This paper described the ADDIE phases in sequence, which were continuously created and revised during the E-Module-based volleyball learning development process.

Analysis Phase

The first stage of the ADDIE model, analysis, involves a comprehensive examination of various aspects. Learning needs are identified through surveys, interviews, and observations, revealing specific gaps and requirements related to volleyball education. Additionally, an in-depth understanding of the target audience is attained, encompassing their skill levels, preferences, and learning styles. Contextual analysis considers the environment in which the volleyball learning will occur, factoring in available resources and potential constraints.

Design Phase

Moving to the design stage, a meticulous instructional blueprint is developed. This blueprint includes clear objectives, a structured content plan, and innovative assessment methods. Designing the user interface (UI) and user experience (UX) is critical for an engaging learning journey. Collaborative design sessions involving instructional designers, subject matter experts, and multimedia specialists ensure a holistic approach. Storyboarding is employed to visually map out the module's flow, and prototype development allows for early feedback before full-scale development. Three validators, namely subject matter experts, instructional media specialists, and language experts, are involved in the design validation process.

Develop Phase

The development stage sees the actual creation of the e-module content based on the design specifications. Multimedia elements such as videos, images, and interactive quizzes are incorporated to enhance the learning experience. The integration of the e-module with a learning management system (LMS) is considered for seamless access and tracking. Development involves content creation using authoring tools and programming for interactive features. Rigorous quality assurance ensures a bug-free and effective E-Module.

Implement Phase

As the implementation stage unfolds, the e-module is launched and distributed to the target audience through appropriate channels. Training is provided to instructors, and support mechanisms are established for learners to ensure effective utilisation of the module. This stage marks the practical application of the developed educational resource with a specific focus on students from the Department of Physical Education, Health, and Recreation at Universitas Negeri Medan, comprising 3 classes with a total of 90 participants.

Evaluate Phase

The final stage, evaluation, involves a comprehensive assessment of the E-Module's effectiveness. Learning outcomes are measured against predefined objectives, and user feedback is gathered from students in the Department of Physical Education, Health, and Recreation at Universitas Negeri Medan who took the volleyball game course. The overall effectiveness of the E-Module in meeting identified learning needs is analyzed. Three validators—subject matter experts, instructional media specialists, and language experts—contribute to the validation process. This evaluative feedback is crucial for continuous improvement, informing future iterations of the E-Module or similar learning products. The evaluation phase closes the loop, creating a dynamic, and responsive development process.

RESULTS AND DISCUSSION

The purpose of this research was to develop products in the form of volleyball teaching materials. Volleyball teaching media that had been consulted with supervisors and made improvements were then validated by material experts, media experts, and linguists using a volleyball teaching media assessment sheet that had previously been made.

Analysis

In the analysis stage, the researcher used observation methods during volleyball lectures. This included conducting interviews with teaching lecturers. Observations and interviews aimed to understand the implementation of the curriculum, the dynamics of lectures, and the utilisation of teaching materials in physical education courses.

Lecture Activities

In lecture activities, lecturers generally use the lecture method and a textbook-oriented approach, which is largely lecturer-centred. The majority of lecture activities utilise the expository method, where the instructor provides explanations and demonstrations in front of the class while students listen to instructions. This activity also involves question-and-answer sessions between the instructor and students. In addition, the lecturers have also not made learning media for lectures and have not used learning media, either in print or electronic form, in lectures.

Based on the analysis of the lecture activities, a learning medium was developed for the volleyball course that can overcome the individual differences of students. The hope is that this learning medium can increase students' involvement in the Physical Education, Health, and Recreation lecture process.

Use of Teaching Materials

The instructor uses textbooks and students' worksheets and occasionally shows videos and displays photos related to physical education material. In order to document the material, students must record the instructor's information.

Feasibility Assessment of Teaching Materials

The teaching media for volleyball lectures underwent feasibility testing by material experts and learning media experts. This test was carried out in the Physical Education, Health, and Recreation study programme and involved students as respondents. The main objective is to get criticism and suggestions to improve the quality of learning media. Based on the explanation above, there is a need for new developments in lecture teaching media, especially in the development of teaching media for volleyball lectures. This medium is expected not only to be suitable for lecture activities but also to increase visual appeal and increase students' independence in understanding the basic techniques of volleyball lectures.

Design

The design phase is a crucial step in crafting instructional media for volleyball lectures. During this phase, the research process includes designing research instruments to measure the feasibility of the developed teaching media.

Gathering Draft Materials

The initial step involves collecting source materials for the volleyball lecture teaching media from various outlets, including books. Additionally, multimedia elements such as photos and videos are sourced from platforms like YouTube.

Creating Validation Research Instruments for Subject Matter and Instructional Media Experts

The second step involves formulating assessment instruments for experts and student response questionnaires for the teaching medium. The evaluation instruments for expert and student responses take the form of Likert scale questionnaires, featuring four response options: strongly agree (SA), agree (A), disagree (D), and strongly disagree (SD). These responses are then converted into scores of 4, 3, 2, and 1.

The subject matter expert assessment instrument comprises 20 items covering various aspects, including content suitability, language, and presentation. Meanwhile, the instructional media expert assessment instrument consists of 25 items evaluating screen design appearance, user-friendliness, consistency, utility, and graphics. The student response questionnaire encompasses 25 statements evaluating content suitability, language, utility, and graphics. Subsequently, the questionnaire was consulted with the supervising instructor to be used as research instruments for material validation and product validation of the volleyball lecture teaching media.

Crafting the Framework for Teaching Media

The development of the framework for volleyball lecture teaching media generally consists of five main sections: instruction, core competencies and learning objectives, content, video, and developer profile. The instructional section provides guidance and

usage instructions for the teaching medium. The section on core competencies and learning objectives outlines the goals students should achieve. The content section encompasses six discussion topics presented through text and images. The video section includes six discussion topics presented through video and audio. Additionally, a developer profile is included.

Developing the Content of the Instructional Media

The content presented in the media primarily focuses on learning activities in physical education, specifically on the topic of volleyball. Each module includes text, images, audio, and video. In this design phase, the produced product is the draft material intended for use as instructional material for the volleyball teaching medium, which will subsequently be converted into electronic form.

Figure 2. Volleyball E-Module Design and Product
(https://heyzine.com/flip-book/d45c693d0e.html)

Develop

The development stage consists of two steps, namely (1) the development and making of volleyball teaching media and (2) product validation. The results of the volleyball teaching media development stage of learning activities for basic volleyball material.

Material Expert Validation

Material validation is carried out to assess whether the volleyball e-module made meets the eligibility standards and to receive input to improve its quality. The results of stage 1 and stage 2 validation are as follows:

Table 1. Material Expert Validation Results (Stage 1)

Assessment Aspect	Average Score per Aspect	Percentage	Category
Content Eligibility	3,5	88%	Very Good
Language	3,3	83%	Very Good
Presentation	3,3	83%	Very Good
Overall Average	3,4	85%	Very Good

Based on Table 1, the assessment of volleyball teaching media conducted by material experts on the material in volleyball teaching media results in an overall average

assessment score of 3.4 with a percentage value of 85% of the maximum score of 4.00 with a very good product category, with a general assessment category that is feasible to use with revision.

Table 2. Material Expert Validation Results (Stage 2)

Assessment Aspect	Average Score per Aspect	Percentage	Category
Content Eligibility	3,6	91%	Very Good
Language	3,5	88%	Very Good
Presentation	4	100%	Very Good
Overall Average	3,7	93%	Very Good

The assessment of volleyball teaching media conducted by material experts on the material in volleyball teaching media results in an overall average assessment score of 3.7 with a percentage value of 93% of the maximum score of 4.00 with a very good product category and a general assessment category that is feasible to use without revision. Based on Table 2, the assessment of volleyball teaching media conducted by material experts on the material in volleyball teaching media results in an overall average assessment score of 3.4 with a percentage value of 85% of the maximum score of 4.00 with a very good product category, with a general assessment category that is feasible to use with revision.

Media Expert Validation

Validation by media experts includes aspects of screen design appearance, aspects of ease of use, aspects of consistency, aspects of usefulness, and aspects of graphics. Validation by media experts aims to obtain information, criticism, and suggestions so that the volleyball teaching media developed becomes a good product in terms of screen design appearance, ease of use, consistency, usefulness, and graphics.

Table 3. Media Expert Validation Results (Stage 1)

Assessment Aspect	Average Score per Aspect	Percentage	Category
Display Screen Design	3	75%	Good
Ease of Use	3,7	92%	Very Good
Consistency	3,3	83%	Very Good
Usability	3	75%	Good
Graphics	3,2	80%	Very Good
Overall Average	3,2	81%	Very Good

Based on Table 3, the assessment of volleyball teaching media conducted by media experts on the developed volleyball teaching media resulted in an overall average assessment score of 3.2 with a percentage value of 81% of the maximum score of 4.00 with a very good product category and a general assessment category that is feasible to use with revision. The results of the validation of volleyball teaching media by media experts are shown in Table 4.

Table 4. Media Expert Validation Results (Stage 2)

Assessment Aspect	Average Score per Aspect	Percentage	Category
Display Screen Design	3,7	93%	Very Good
Ease of Use	3,8	96%	Very Good
Consistency	3,7	92%	Very Good
Usability	3,3	81%	Very Good
Graphics	4	100%	Very Good
Overall Average	3,7	92%	Very Good

Based on Table 4, the assessment of volleyball teaching media conducted by media experts on the developed volleyball teaching media resulted in an overall average assessment score of 3.7 with a percentage value of 92% of the maximum score of 4.00

with a very good product category and a general assessment category that is feasible to use without revision.

Language Expert Validation

Validation by linguists aims to obtain information, criticism, and suggestions so that the volleyball teaching medium developed becomes a good product in terms of language. As well as useful for knowing whether the language used by researchers has met the applicable rules so that it is easy for children to understand. The assessments include self-instruction (language used to provide instructions), editorial language of sentences in each material, and educational diction.

Table 5. Results of Linguist Validation (Stage 1)

Assessment Aspect	Average Score per Aspect	Percentage	Category
Self-Instruction	3,5	88%	Very Good
Language	3,3	83%	Very Good
Educational Diction	3,3	83%	Very Good
Overall Average	3,4	85%	Very Good

Based on Table 5, the assessment of volleyball teaching media conducted by linguists on the material in volleyball teaching media results in an overall average assessment score of 3.4 with a percentage value of 85% of the maximum score of 4.00 with a very good product category, with a general assessment category that is feasible to use with revision.

Table 6. Results of Linguist Validation (Stage 2)

Assessment Aspect	Average Score per Aspect	Percentage	Category
Self-Instruction	3,6	91%	Very Good
Language	3,5	88%	Very Good
Educational Diction	4	100%	Very Good
Overall Average	3,7	93%	Very Good

Based on Table 6, the assessment of volleyball teaching media conducted by linguists on the material in volleyball teaching media results in an overall average assessment score of 3.4 with a percentage value of 85% of the maximum score of 4.00 with a very good product category, with a general assessment category that is feasible to use after revision.

Implement

After the volleyball teaching medium went through a medium-scale trial stage, the volleyball teaching medium was utilised in the volleyball learning process with a total of 90 students. Students as respondents provided an assessment response to volleyball teaching media based on aspects of presenting content feasibility, linguistic aspects, aspects of usefulness, and graphical aspects to see student responses to the use of volleyball teaching media in the volleyball learning process. The results of the response assessment of volleyball teaching media can be seen in Table 8.

Table 8. Results of the Large Group Trial

Assessment Aspect	Average Score per Aspect	Percentage	Category
Content Eligibility	3,5	86%	Very Good
Language	3,4	87%	Very Good
Usability	3,3	87%	Very Good
Graphics	3,3	85%	Very Good
Overall Average	3,4	86%	Very Good

Based on Table 8, the assessment of volleyball teaching media conducted by media experts on the developed volleyball teaching media resulted in an overall average assessment score of 3.5 from a maximum score of 4.00 with a percentage value of 86% and a very good product category. From the research results above, it shows a very good percentage of student responses to volleyball teaching media.

Evaluate

After going through the development, expert validation, trial, and implementation stages, the volleyball e-module has been improved based on feedback from all parties involved. Nevertheless, this research still has the potential to be improved. Thus, this e-module was successfully developed and tested well in learning volleyball, and the positive response of students showed that this is an excellent learning tool. Future research could focus on further evaluation of the impact of using this e-module on students' learning outcomes and performance in volleyball.

This research aimed to develop an e-module as a learning tool in volleyball. This e-module has gone through a series of development stages, validation by experts, medium-group trials, and implementation in the learning process with students. The results of this study provide an overview of the effectiveness and quality of e-modules as learning aids in the context of volleyball learning.

The results of the assessment by material experts, media experts, linguists, and students show that this e-module fulfils high feasibility criteria. At the validation stage by material experts, the e-module received a “very good” assessment, with a percentage value reaching 93% at stage 2. This shows that the material presented in the e-module is adequate and in accordance with the needs of volleyball learning. Furthermore, in terms of screen design appearance, ease of use, consistency, benefits, and graphics, the e-module also received a “very good” rating from the media expert at stage 2, with a percentage value of 92%. This indicates that the e-module has a user-friendly and consistent interface and provides high benefits for learning.

The assessment by linguists also shows that the language used in the e-module has met the applicable rules, including the use of self-instruction, sentence editorial language, and educational diction. In stage 2, the e-module received a “very good” rating with a percentage value of 93%. The results of the trial in the medium and large groups also showed a positive response from students to the e-module. The average assessment score in both groups showed a “very good” category, with a percentage value reaching 87% in the medium group and 86% in the large group. This indicates that the e-module successfully provides benefits for understanding and learning volleyball for students.

This research makes a significant contribution to the field of technology-based learning media development, particularly in the context of sports education. These findings are in line with strengthened previous research, which emphasises the effectiveness of e-modules in various domains, including sport education (Suripto, 2019; Wulandari & Wibowo, 2022). Based on this foundation, this study explores the implications and depth of these results, explaining their importance and potential impact on the advancement of volleyball sport education.

The results of this study revealed some important insights into the development and application of technology-based learning media. In particular, the e-module demonstrated its effectiveness in increasing students’ understanding and interest in volleyball learning, highlighting its potential as a powerful learning support tool. This underscores the need for further exploration and integration of technology in sports education, in line with the findings of Jacob et al. (2021) and Johan et al. (2022), who emphasised the important role of experts in crafting high-quality e-modules.

In the broader context of technology in education, the positive impacts observed in this study resonate with the benefits identified in exercise physiology, where e-modules incorporating online quizzes and supplementary materials have shown advantages such as regular assessment, constructive feedback, and improved pass rates (Leary et al., 2022). This convergence of findings across different educational domains underscores the versatility and effectiveness of e-modules.

However, it is crucial to acknowledge the weaknesses and limitations inherent in the study. While the e-modules in this research met stringent feasibility standards, the dynamic nature of technology necessitates continuous attention. Regular maintenance and updates are imperative to sustain their relevance and efficacy in supporting learning. Additionally, the study's focus on volleyball education may limit the generalizability of the findings to other sports contexts, emphasising the need for caution in extrapolating the results to diverse sporting scenarios like football, badminton, or athletics.

Alternative interpretations of the results should also be considered. While the positive impacts of e-modules on learning outcomes are evident, variations in student demographics, educational settings, or instructional methods may influence the degree of effectiveness. Exploring these nuances could provide a more nuanced understanding of the results. Looking ahead, the positive strides made in this study should guide future research endeavors.

Suggestions for the future research include a comprehensive exploration of e-module applications in various sports learning contexts. Investigating the transferability of the affirmative outcomes to other sports, such as football, badminton, or athletics, could broaden the applicability of e-modules in diverse training scenarios. Additionally, continued efforts to refine e-module quality and unravel their potential across varied sports learning domains are imperative for the future.

In conclusion, while this study represents a significant advancement in technology-based learning media development within volleyball education, there is still much ground to cover. The study underscores the importance of persistent efforts to enhance e-module quality and explore their broader applications across different sports. In doing so, technology can continue to play a vital role as an effective ally in fortifying the learning process in sports education (Geisen et al., 2023; McCosker et al., 2022).

CONCLUSION

The culmination of this study has yielded the creation and validation of e-modules as ground-breaking learning tools within the domain of volleyball education. This research stands out for its creative approach to e-module development, which is characterized by cross-disciplinary collaboration involving material, media, and language experts. This collaborative model, proven successful in this study, offers a blueprint for the creation of technology-based learning media across diverse educational contexts. The developed e-module stands not only as a practical resource for volleyball education but also as a reference point for future research endeavours in crafting learning media for sports. Consequently, this study not only establishes a robust groundwork for technology-based learning media in the realm of sports education but also underscores the critical role of cross-disciplinary collaboration, emphasising the imperative for ongoing exploration and advancement in this burgeoning field.

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CONFLICT OF INTEREST

The authors state no conflict of interest.

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