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Developing Baamboozle-Based Learning Media to Enhance Badminton Footwork Techniques for Senior High School Students

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Abstract

Background: The use of technology-based learning media in Physical Education, Sports, and Health remains limited, particularly in badminton footwork instructional materials. This limitation affects students' motivation, engagement, and understanding. Therefore, innovative and interactive learning media are required to support effective learning.
Aims: The aim of this research is to develop Baamboozle-based learning media for badminton footwork technique materials for senior high school students and to evaluate its feasibility and examine student responses.
Methods: This study employed research and development (R&D) using the ADDIE model with stages of analysis, design, development, implementation, and evaluation. The sample consisted of eleventh-grade students at Rambang Dangku State Senior High School 2. Data were analyzed using percentage analysis techniques.
Results: This research resulted in a Baamboozle-based learning media product that was declared highly suitable by experts. Validation results showed a percentage of 86% from material experts, 84% from language experts, and 88.89% from media experts. Teacher responses reached 92.5%, categorized as very interesting. Student responses were 94.58% in minor trials and 93.86% in major trials, both classified as very interesting.
Conclusion: The learning media developed using Baamboozle is highly suitable and effective for application in teaching badminton footwork techniques at the high school level and can be an alternative interactive learning medium for physical education subjects.

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INTRODUCTION

Physical Education, Sports, and Health subjects play an important role in developing students' physical, cognitive, and social abilities through formal learning processes. Physical Education, Sports, and Health is a subject that aims to improve physical fitness, discipline, cooperation, and honesty, and to shape healthy lifestyles in students (Rozi et al., 2023). At the senior high school level, the curriculum includes small ball games, one of which is badminton, which requires mastery of basic techniques so that students can play optimally (Aryanti et al., 2021; Destriani et al., 2018).

Badminton is a sport played using a racket to hit a shuttlecock over the net with the aim of dropping the shuttlecock in the opponent's court to score points (Edmizal & Maifitri, 2021). One of the fundamental skills that a player or athlete needs to master is footwork technique (Islamiah, 2019). This footwork technique allows players to move efficiently around the court and position their

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bodies correctly when hitting the shuttlecock (Gunawan et al., 2017). Good footwork skills affect movement speed, body balance, and shot accuracy (Hamid & Aminuddin, 2019).

However, based on initial observations at Rambang Dangku 2 Public High School, it was found that physical education teachers predominantly used conventional teaching methods such as lectures and simple practices, and have not made optimal use of technology-based learning media. This situation causes students to quickly become bored and less motivated in their learning, especially when it comes to badminton footwork techniques, which require a deep understanding of movement concepts. The lack of interactive learning media has resulted in low student engagement and comprehension.

Learning media serve a crucial function in facilitating the instructional process, as they enhance learner engagement, promote interactivity, and improve overall instructional effectiveness. (Tafonao, 2018). The development of innovative learning media is expected to increase the motivation and activity of students in physical education, health, and sports learning (Destrianiet al., 2022). Technology makes it easier for users to obtain information (Hartati et al., 2021). One type of technology-based learning media that can be utilized is the Baamboozle application, which is a web-based educational game application designed to create a fun learning atmosphere through quizzes and group work (Sulistyowati & Suteki, 2023). Therefore, the development of Baamboozle-based instructional media focused on badminton footwork techniques is considered necessary to improve the quality of PJOK learning at the high school level.

Learning media are tools used to convey learning messages so that they can stimulate the minds, feelings, attention, and motivation of students in achieving learning objectives (Saleh & Syahruddin, 2023). The use of media is adjusted to the goals to be achieved so that it is right on target (Aryanti et al., 2020). Learning media involves all things that can convey information through various methods, such as stimulating students' thoughts, feelings, and enthusiasm for learning (Daniyati et al., 2023). The use of media in learning has been proven to increase students' interest in learning and reduce boredom throughout the educational process (Khoiro et al., 2023). One learning approach that can be utilized in today's digital era is the Baamboozle application (Kusyani & Ray, 2023).

Baamboozle is a game-based learning platform that can be used online without requiring students to have an account. This application provides group-based quiz features that encourage collaboration, communication, and critical thinking skills among students (Rizal & Rosiyanti, 2024). The use of Baamboozle in learning has been proven to have a positive impact on student motivation and engagement in various subjects (Murti et al., 2023).

Footwork in badminton is a foot movement technique that serves to adjust the body position so that players can hit the shuttlecock effectively and efficiently (Azhar, 2022). Good footwork techniques allow players to reach all areas of the court quickly, maintain body balance, and improve the quality of their game (Nando & Wulandari, 2018). Therefore, learning media is needed to help students understand and master footwork techniques optimally.

Several previous studies have shown that Baamboozle-based instructional media are considered valid, practical, and effective in increasing students' motivation and academic performance (Amalinda, 2024). However, the application of Baamboozle media in Physical Education, Sports, and Health (PJOK) learning, especially in badminton footwork techniques at the high school level, is still very limited.

Although other digital media, such as instructional videos or fitness apps, have been used in physical education, they often lack interactivity, real-time engagement, or collaborative features. In contrast, Baamboozle offers live quizzes, group challenges, and immediate feedback, making it more suitable for teaching badminton footwork, which requires active student participation and quick decision-making. This highlights a research gap and justifies the need to develop Baamboozle-based learning media specifically for high school PJOK classes.

The development of Baamboozle-based media aims to improve the quality of physical education by providing an interactive and enjoyable learning experience. By integrating badminton

footwork techniques into Baamboozle, students are expected to grasp movement concepts more easily in a fun and active way. Additionally, this learning media assists teachers in delivering lessons innovatively and effectively.

In line with this, this research is conducted to answer the following research questions: (1) What results are obtained from expert validation of Baamboozle-based learning media for badminton footwork material for grade 11 students at Rambang Dangku 2 Public High School? (2) What is the response of students to the Baamboozle application-based learning media on badminton *footwork* material for grade 11 students at Rambang Dangku 2 Public High School?

METHOD

This research was classified as development research (Research and Development/R&D) aimed at developing Baamboozle-based instructional media designed to teachbadminton footwork techniques for high school students. Development research is a systematic process or series of steps used to produce new products or improve existing products so that they can be scientifically justified (Okpatrioka, 2023).

This study adopted the ADDIE development framework, which comprises five stages, namely analysis, design, development, implementation, and evaluation (Aryanti et al., 2017). The ADDIE model was chosen because it offered a systematic, structured, and easy-to-apply process for developing learning media based on technology (Aulia et al., 2025).

One physical education teacher from Rambang Dangku State Senior High School 2 participated in the needs analysis interview and the evaluation of the learning media. Grade 11 students at the same school were involved in the needs analysis as well as in the testing of the Baamboozle learning media. The trials were conducted in two stages: a small-scale trial involving six students to initially evaluate the feasibility and usability of the media, followed by a large-scale trial with 22 students to assess its effectiveness and student responses on a broader scale.

The participants in this study consisted of one Physical Education (PJOK) teacher and all grade 11 students at Rambang Dangku State Senior High School 2 in the 2024/2025 academic year. The sampling technique used was purposive sampling, which is a sampling technique with certain considerations in accordance with the research objectives and characteristics of the material being developed.

The research instruments used were questionnaires and interviews. A questionnaire is a data collection technique in which respondents are given a series of written questions to complete (Mar et al., 2019). The research instruments included:

1. Needs Analysis Questionnaire

This questionnaire was used to determine the interests, learning difficulties, and needs of students regarding learning media. The questionnaire used a Guttman scale with *Yes* and *No* answer options. The questionnaire data was used as the basis for determining the type of media and learning design that suited the characteristics of the students (Chumaidi, 2023).

Table 1. Guttman Scale of Student Responses (Rahmi et al., 2019)

Student Responses	Score
Yes	1
No	0

2. Expert Validation Questionnaire

The validation questionnaire was given to subject matter experts, media, and language experts to evaluate the appropriateness of the developed learning media. The validation instrument used a five-point Likert scale, namely very good (5), good (4), fair (3), poor (2), and very poor (1). The aspects assessed included the suitability of the material with the curriculum, content, language suitability, display design, and media interactivity (Chumaidi, 2023).

Table 2. Likert Scale (Chumaidi, 2023)

Criteria	Score
Very Good (VG)	5
Good (G)	4
Fair (F)	3
Poor (P)	2
Very Poor (VP)	1

3. Teacher and Student Response Questionnaire

This questionnaire was used to determine the level of attractiveness, ease of use, and benefits of Baamboozle learning media in PJOK learning.

This study was conducted at Rambang Dangku State Senior High School 2 from October 3 to November 26, 2025. The research procedure followed the ADDIE model stages as follows:

1. Analysis Stage
   Teacher needs were analyzed through interviews, and student needs were analyzed through the distribution of questionnaires to identify problems and needs in PJOK learning.
2. Design Stage
   The researcher designed badminton footwork techniques, quiz questions, and the Baamboozle media display design in accordance with the curriculum and learning objectives.
3. Development Stage
   The learning media was developed and subsequently evaluated by experts in subject content, language, and educational media. Revisions were made based on suggestions and input from the experts.
4. Implementation Stage
   The Baamboozle-based learning media was implemented with physical education teachers and eleventh-grade students through both small-scale and large-scale trials. The Baamboozle quiz was conducted in the classroom after physical training sessions as a tool to reinforce students' understanding of the footwork techniques they had practiced on the field.
5. Evaluation Stage
   The evaluation was conducted formatively based on expert validation results and user responses to determine the instructional media's feasibility and appeal.

Data analysis was performed using quantitative descriptive statistics. The data from expert validation and user response questionnaires were analyzed by calculating the feasibility percentage using the expert validation and audience validation formulas (Chumaidi, 2023). The formulas used to calculate the validation scores provided by media specialists, physical education specialists, language specialists, and student response questionnaires are as follows:

$$\text{V} - \text{ah} = \frac{tse}{tsh} x\ 100\%$$

Explanation:
V–ah: Expert validation (percentage value)
Tse: Total empirical score (expert validation result value)
Tsh: Maximum total score (expected maximum value)

The percentage results are then categorized into product feasibility levels and learning media attractiveness levels according to the established criteria.

Table 3. Product Feasibility Categories (Chumaidi, 2023)

Achievement Level	Description
85,01%–100,00%	Highly valid, or can be used without revision
70,01%–85,00%	Sufficiently valid, or usable but requires minor revisions
50,01%–70,00%	Insufficiently valid, or not recommended for use due to the need for major revisions
01,00%–50,00%	Not valid

To test the level of attractiveness of the Baamboozle application based on questionnaire data, the percentage results achieved in small and large group trials can be compared using the following table.

Table 4. Percentage of Baamboozle Media Appeal (Chumaidi, 2023)

Criteria	Level of Attractiveness
81%–100 %	Very Attractive
61%–80%	Attractive
41%–60%	Fairly Attractive
21%–40%	Less Interesting
0–20%	Not Interesting

There are several limitations associated with this study, including:

1. The study was only conducted at one school, namely Rambang Dangku State Senior High School 2.
2. This study covered only learning materials related to badminton footwork techniques.
3. The research only reached the implementation stage, so the evaluation of the media's effectiveness on learning outcomes has not been tested through pre-test and post-test comparisons.

Therefore, the research results cannot be generalized broadly and require further research with a larger subject coverage.

RESULTS AND DISCUSSION

Results

Product Development Results

The Baamboozle-based instructional media for teaching badminton footwork techniques to eleventh-grade students at Rambang Dangku State Senior High School 2 was developed through a series of systematic phases, including needs analysis, design, development, implementation, and evaluation. Each phase involved organized validation and pilot testing procedures.

(1) Expert Validation Results

The developed media were evaluated by three experts, consisting of a subject-matter expert, a language expert, and a digital media expert. The results of the assessment indicated that all experts rated the media in the high category

Table 5. Expert Validation Results

Category of Validators	Score	Feasibility
Learning Material Expert	86 %	Very Feasible
Language Media	84 %	Feasible
Media Expert	88,89%	Very Feasible

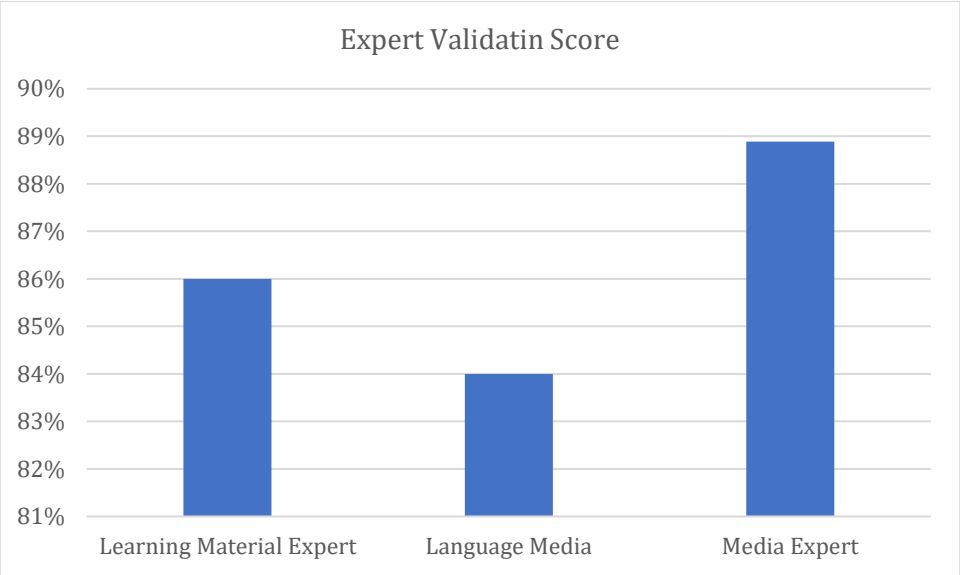

Figure 1. Expert Validation Results

Based on the expert evaluation results shown in Table 5, the media was proven to have good quality and suitability. The material expert validation obtained a score of 86%, which falls into the *very valid* category. This indicates that the content accuracy, alignment with the curriculum, as well as the clarity of the questions and answer keys have met the required feasibility standards. At this stage, several improvements were made according to input from experts to make the material more interactive and easier to understand.

The language expert validation achieved a score of 84%, categorized as *fairly valid*. The language used in the media was considered appropriate according to Indonesian language conventions and easy for students to comprehend. Minor revisions were carried out to improve sentence structure and the accuracy of terminology usage.

The media expert validation resulted in a score of 88.89%, classified as *very good*. The media expert assessed that Baamboozle has an attractive visual design, can be easily utilized by both teachers and students, features a clear layout of questions and images, and is able to enhance interaction and collaboration among students.

This evaluation indicates that the media has fulfilled the principles of instructional media, namely being engaging, interactive, and easy to operate. Overall, the validation findings indicate that the Baamboozle-based media is highly feasible and prepared for testing during the implementation phase.

(2) Trial Results

The outcomes of the physical education teacher evaluation, as well as the small-scale and large-scale trials, are presented in Table 6.

Table 6. Trial Results

Trial Type	Score (%)	Feasibility Category
Teacher Trials	92.5%	Very Attractive
Small Group Trials	94.58%	Very Attractive
Large Group Trials	93.86%	Very Attractive

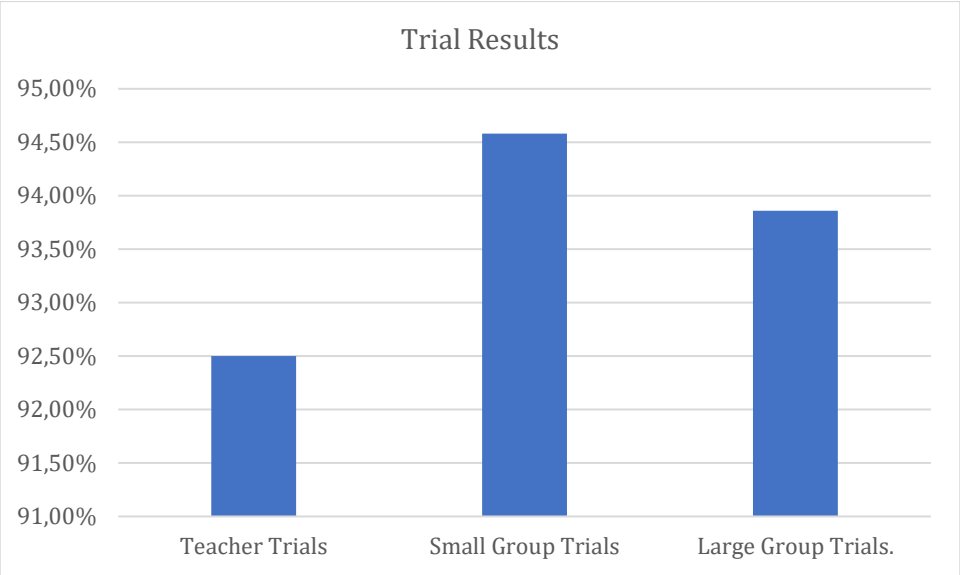

Figure 2. Trial Results

The trial outcomes reported in Table 6 show that the teacher assessed the Baamboozle media as very helpful in delivering badminton footwork instructional material, aligned with the learning objectives, and capable of increasing students' motivation and engagement during the learning process. The media was also considered practical and easy to integrate into Physical Education (PJOK) learning activities at school.

Student responses at the evaluation stage showed a percentage of 94.58% in the small-scale trial, categorized as *highly engaging*, and 93.86% in the large-scale trial, also categorized as *highly engaging*. Students stated that learning using the Baamboozle media was more enjoyable, not boring, and helped them understand badminton footwork technique material more effectively. The game-based characteristics of media that use games encourage students to be more involved, enthusiastic, and motivated to be involved in the instructional process. The results suggest that the Baamboozle media can provide a meaningful learning experience and enhance students' learning interest.

Thus, the Baamboozle media is feasible to be used as an innovative learning medium at the senior high school level.

Discussion

The results of this study indicate that Baamboozle-based learning media for badminton footwork techniques are very feasible and interesting to use in physical education classes in high schools. These findings are in line with the theory that game-based learning media can increase student motivation, attention, and engagement in the learning process (Tafonao, 2018).

The success of this media cannot be separated from the systematic application of the ADDIE development framework. At the analysis stage, the needs of students and teachers were successfully identified, so that the media developed was truly in line with the learning problems in the field. The design and development stages ensured that the material, appearance, and interactivity of the media were in line with the PJOK learning objectives.

The use of Baamboozle as a learning medium creates a competitive and collaborative learning environment, encouraging students to participate more actively. This is in line with previous research stating that Baamboozle effective enhances students' engagement and interest in learning (Murti et al., 2023).

From the perspective of Human-Computer Interaction (HCI), the Baamboozle learning media exemplifies essential principles, including usability, feedback, and learner engagement. Its user-friendly interface minimizes cognitive effort, allowing students to navigate the quiz smoothly and efficiently, thus supporting usability. The platform provides immediate feedback, enabling learners to identify and correct errors promptly, in accordance with HCI's emphasis on timely and informative

feedback. In addition, the integration of gamification and interactive components sustains students' attention and motivation, fostering active and collaborative participation.

A deeper analysis of the validation scores reveals that the linguists' evaluation (84%) was lower compared to subject matter (86%) and media experts (88.89%). This may indicate that certain language aspects, such as clarity of instructions, terminology accuracy, or linguistic simplicity, required improvement to match the students' comprehension level. Addressing these linguistic suggestions during revisions ensures that the media is not only engaging but also linguistically accessible and understandable for high school learners.

In addition, this medium helps students understand the concept of footwork techniques in a more enjoyable way, even though the material is practical in nature. Thus, the Baamboozle medium can be an alternative solution to PJOK learning, which has tended to be monotonous and centered on conventional methods.

Implications

The results of this study indicate a significant impact on the teaching of Physical Education, Sports, and Health at the senior high school level, particularly in relation to basic badminton technique materials. The use of Baamboozle-based learning media has proven effective in increasing the motivation, participation, and activity of eleventh-grade students during the learning process of footwork techniques. The utilization of game-based educational media aligns with the principles of *Kurikulum Merdeka*, which emphasizes active, interactive, and student-centered learning. Furthermore, this media can assist PJOK teachers in delivering technical and abstract information in a clearer and more engaging manner through quiz-based methods and group collaboration, as highlighted in previous studies on the use of learning media (Iskandar et al., 2022).

Research contribution

This research contributes to the discipline of physical education, especially in the development of technology-based learning media. The main contributions of this research are:

1. Producing Baamboozle-based learning media that can be used for badminton footwork technique material.
2. Providing a reference for physical education teachers in developing innovative and interactive learning.
3. Adding empirical studies related to the application of Baamboozle media in physical education learning at the high school level.

Limitations

The limitation of this study is that it was only conducted in one school and one class, namely eleventh-grade students, so the results cannot yet be generalized to other classes or educational contexts. Moreover, the Baamboozle-based learning media developed and implemented in this study addressed only badminton footwork techniques; consequently, its effectiveness in other badminton content areas or different sports disciplines remains unknown. Second, the development of the learning media was tested only up to the implementation stage and did not proceed to a long-term evaluation stage, particularly to examine sustained improvements in students' motor skill learning outcomes. Consequently, the long-term impact of Baamboozle media has a long-term impact on students' motor skill development could not be comprehensively analyzed. Moreover, the effectiveness of Baamboozle-based learning media is highly contingent upon the availability of internet access and appropriate digital infrastructure. This condition may become an obstacle to implementation, especially in schools with limited technological infrastructure.

Suggestions

Drawing on the results and limitations of this study, several suggestions are presented:

1. Further research is recommended to test the effectiveness of Baamboozle learning media on improving learning outcomes through an experimental design (pre-test and

post-test).
2. This learning media can be further developed for other physical education subjects in the future.
3. PJOK teachers are expected to utilize and adapt technology into their teaching practices.

CONCLUSION

Baamboozle-based learning media for badminton *footwork* techniques have been successfully implemented in accordance with the needs identified in the Introduction section. The main issues raised in the introduction, namely the lack of technology utilization, low student motivation, and difficulty in understanding *footwork* techniques, have been addressed through research results and discussions that show strong compatibility. Expert validation results are in line with the research objectives. This media was validated by experts with very positive results from subject matter specialists (86%), language specialists (84%), and media specialists (88.89%). Baamboozle media is substantively suitable for use in physical education learning in high schools. User responses from PJOK teachers (92.5%) and students in minor trials (94.58%) and major trials (93.86%), confirm that this media is very interesting. The findings indicate that Baamboozle media contributes to improved student participation and enthusiasm in the learning process, consistent with the objectives described in the study's expected benefits.

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Ultimately, this study is expected to contribute to the development of Physical Education, Sports, and Health instruction, particularly in promoting the use of technology-based learning media.

AUTHOR CONTRIBUTION STATEMENT

MQ designed the research concept, collected field data, developed the Baamboozle media product, and drafted the initial manuscript. SA coordinated the entire article writing process. WIB assisted in compiling the article according to the template. FAN compiled the bibliography according to the journal template. H assisted in checking the appropriateness of the research methods. SA assisted in drafting the conclusions and recommendations.

AI DISCLOSURE STATEMENT

The authors state that artificial intelligence (AI) technology was used in a limited manner during the manuscript preparation process, primarily to assist with language formulation, grammar improvement, and the organization of the writing structure. All contents, data, analyses, and research conclusions are entirely the responsibility of the authors.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest, whether financial, institutional, or personal, that could have influenced the conduct of this study, data analysis, manuscript preparation, or the publication of the research findings. All stages of the research were carried out independently in the interest of advancing knowledge in the field of physical education.

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