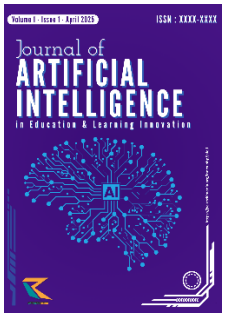

Enhancing basketball technique learning using I-spring application: A study in high school physical education

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ABSTRACT

Background: High school students feel less able to master the subject of Physical Education, Sports, and Health (PJOK) Basketball material in a relatively short meeting, so it needs innovative learning.
Objectives: This research was conducted to develop learning media for basketball game material based on the I-Spring application to facilitate students' learning.
Methods: This research uses the Research and Development (R&D) method using the ADDIE model, which refers to Lee and Owens. Data collection was done through direct observation and questionnaire distribution. The research subjects were the students of Senior High School 1 Gondanglegi, Malang Regency, Indonesia, which amounted to 866 students. The data analysis method used is descriptive qualitative using Likert scale calculation.
Results: The observation results showed that 95.5% of students had participated in basketball learning in class or on the field, 71.2% of students had difficulty learning the basic techniques of basketball games, and 92.4 students needed application-based learning media to understand more deeply and be able to practice basic basketball techniques. Small group trials on 10 students obtained results of 85.2% and 86.4% for large group trials with 30 students.
Conclusions: The developed product is feasible for PJOK learning, especially basketball material at State Senior High School 1 Gondanglegi. Future studies are encouraged to expand the material coverage and evaluate long-term learning outcomes using the developed application.

Keywords: Basketball, I-spring, learning media, physical education.

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INTRODUCTION

The basketball game is quite famous and is starting to be discussed publicly. The basketball game is a team sport consisting of two teams with five members per team who compete to score each other by entering the ball in the opponent's ring (Zulfiani et al., 2019). Basketball games have several basic techniques, including dribbling, passing, and shooting; to play basketball well and with effective movements, it is necessary to master these basic techniques (Prasetyo & Sukarmin, 2017). These movements are the key to supporting basketball games (Fatahillah, 2018). The Core Competencies (KI) and Basic Competencies (KD) of learning big ball, which is a part of the knowledge and skills competencies in High School Sports and Health Education, emphasizes the importance of analyzing motion and practicing the results of the analysis in order to be able to produce good coordination motion, analyzing motion and practicing it and making an improvement plan, and compiling attacking patterns and defensive patterns and practicing them. This shows that analyzing is critical in producing good and effective coordination movements, and it is a key aspect of the basketball game material in high school education.

The basic technical material of basketball games is complex and challenging to master. Therefore, a careful analysis is needed to produce good movements (Supriyadi, 2016). This basic technique is a movement that needs to be mastered because it is the capital to play basketball well and effectively. At Gondanglegi 1 High School, students have difficulties practicing, often due to a lack of knowledge of performing basic technical movements and the absence of media to access and practice them more easily. This highlights the urgent need for interactive learning media to facilitate material delivery (Arief et al., 2021) and support the detailed analysis of basic technical movements, which can be accessed anywhere. These media, particularly audiovisual ones, are attractive and highly suitable for learning and presenting authentic images and videos.

Learning media in the current era has a significant role in supporting the learning process for students. Using interactive media in learning can break down learning barriers and, most importantly, prevent learning from becoming monotonous (Novita & Harahap, 2020). Learning media captures students' thoughts, attention, feelings, and interests (Nurdyansyah & Fahyuni, 2016). It serves as a conduit for students to absorb information in a structured manner, thereby helping to achieve learning objectives (Nurseto, 2012). Application-based media fosters an interactive learning process, making learning more effective and aiding in the visualization of abstract concepts (Deliviana, 2017). When used correctly and conceptually, learning media can enrich the learning process and overcome obstacles (Adi & Fathoni, 2019). Therefore, the solution to overcoming these obstacles is to utilize learning media based on the efficient I-spring application.

I-spring is a program that is used to help compile materials that are effective, interesting, and readily accepted and understood by students (Kurnia, Darmawan, & Maskur, 2018). I-spring interactive media is an interesting interactive media that teachers and students can use in learning. This media is suitable for use because it has several components, namely images, text, audio, and video, which are suitable for supporting students in learning to understand each material (Ramadhani & Liwayanti, 2021). I-spring is a tool that can convert presentations or power points into flash form; with I-spring, learning media can be more interactive and engaging and can present learning evaluations in various forms (Sastrakusumah, 2018).

Previous research, implementing learning media to increase lay-up learning outcomes, obtained data from cycles I and II, with cycle I learning outcomes in the complete category of 59.3% of 16 students (Idris, 2019). Cycle II increased in the complete category to 82%. Based on the data results, the application of auxiliary media in the form of multimedia can increase the learning outcomes of students' lay-up shots. The results of similar research by Pranata et al. (2021), with the theme of developing audio-visual-based media for shooting material in basketball, obtained data from the analysis based on respondents from learning material experts obtained a percentage score of 94.6% in the outstanding category. Then, the responses from learning experts show a good figure of 92% and are classified as excellent categories. Then, the responses from media experts get a score of 93%, which is categorized as very good. So, the conclusion is that the audiovisual media for shooting basketball for class XI of State Senior High School 2 Singaraja in 2020/2021 is declared suitable for learning. Then, similar research on the development of audiovisual media using the Addie model, a widely accepted instructional design model, for Passing Material (Sokheh, 2017) obtained validation data from the content aspect with a figure of 88%, which can be categorized as good. Regarding learning aspects, it shows 96% and is very good. Then, regarding learning design, it shows a percentage of 84% and can be categorized as good. Based on the data shown above, the passing learning media can be valid to support the teaching and learning process.

Previous learning media development has been carried out through Adobe Flash (Sokheh, 2017), comic-based instruction (Deliviana, 2017), and audiovisual (Pranata et al., 2021; Idris, 2019). These channels have demonstrated the promise of enhanced learning of basketball skills. However, most such studies have examined only isolated skills (such as shooting or lay-up), and few have utilized a systematic, coordinated curriculum related to national health and physical education standards. Moreover, most of the studies have not been interactive and adaptable, which are considered two key aspects of the contemporary instructional design for digital learning systems.

In addition, although e-learning platforms and blended learning methods have been increasingly used in PE, only a small number of studies have explored the use of I-spring as a multimedia authoring tool (as it is a multimedia module that can convert PowerPoint materials into interactive ones) - especially within the context of Indonesian high school PE. Although I-spring can potentially improve motivation and engagement (Kurnia, Darmawan, & Maskur, 2018; Ramadhani & Liwayanti, 2021), using I-spring in skill-based subjects such as basketball is relatively less explored.

Accordingly, this study fills an important void by designing and validating an I-spring-based interactive learning media that not only presents the basic techniques of basketball (through passing, dribbling, and shooting in video formats) but also encompasses quizzes, curricular alignment and teacher support features. Notably, the research contributes to the gap in media studies that incorporate both interactivity and contextual relevance for skill-based learning in the high school setting in Indonesia.

Based on the results of observations by researchers on February 4, 2022, at the State Senior High School 1 Gondanglegi, the following results were obtained by conducting a needs analysis distributed to students through a questionnaire in the form of a Google form. 95.5% of students have participated in basketball learning in class or on the field, 60.6% of students do not use printed media in the form of Student

Worksheets (LKS) or books, 95.5% of students have a Smartphone that can access the internet and download applications, 72.7% of students have used application-based learning media in other subjects, 53% of students have accessed learning the basic techniques of basketball games via the internet, 53% of students have never learned basic basketball technical material using the application, 71.2% of students have difficulty learning basic basketball techniques, 68.2% of students need application-based learning media to understand more deeply and be able to practice basic basketball techniques. Importantly, 92.4% of students agree with the research on developing the basketball material I-spring application, showing their active involvement in the process. This supports the development of application-based teaching materials for basic basketball game techniques to support the learning process. Additionally, it highlights the need for a complete application-based learning concept for high schools, specifically for basketball game material.

METHODS

Study Design and Participants

This study refers to Lee & Owens' (2004) development model, which consists of the following steps: 1) analysis, 2) design, 3) development, 4) implementation, and 5) evaluation.

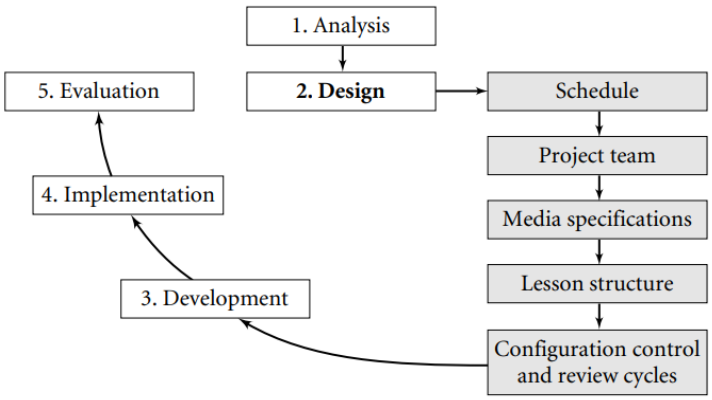

Figure 1. Interactive Multimedia Learning Development Steps (Lee & Owens, 2004)

Figure 1 shows the stages of solving research and development problems in developing an application-based learning media product. The sampling technique in this study is purposive sampling because this research requires participants who meet specific criteria, namely: X, XI, and XII grade students who are learning basketball material, have access to devices and internet connections, and have readiness and willingness to participate in media trials.

Ethical approval statement

Ethical clearance of the study was sought from the Universitas Negeri Malang, Indonesia with the Number: 23.03.4/UN32.14/PB/2022.

Research Instruments

The instrument in this research is a questionnaire sheet to validate the feasibility of the application developed. At this stage, product testing will be conducted on three experts: learning experts, media experts, and basketball experts. The feasibility assessment refers to Table 1 and Table 2.

The first step is to analyze by distributing questionnaires in Google Forms to collect data. **The second step** is designing the product to plan how the product will be made by creating a storyboard to describe the product in general. **The third step** is development, which is the development stage carried out in three stages, namely 1) product manufacturing, carried out by determining the basic technical learning material by Core Competencies (KI) and Basic Competencies (KD) classes X, XI, XII, then making learning videos of basic basketball techniques and making evaluation questions, 2) validation, at this stage product testing will be carried out on three experts, namely learning experts, media experts, and basketball experts, 3) revision, after the product has received validation from experts, the researcher will fix the product with consideration of the criticisms and suggestions of the validators. **The fourth step** is implementation; at this stage, the product will be tested for validity on students to determine the product's suitability with what is needed by students. At this stage, some things need to be considered, namely: (1) Trial design; at this stage, trials are carried out with three stages, namely, evaluation by three experts and small group trials totaling 12 students, large group trials with 30 students (Borg & Gall, 2007), (2) Determining the subjects involved in the study, namely learning experts, basketball experts, media experts and students (3) Type of data, namely using quantitative and qualitative data obtained from the results of expert validation, small group and large group trials, (4) Developing instruments, in collecting data the instrument used is a needs analysis questionnaire for initial stage observations, then a tiny group trial questionnaire, a large group and a questionnaire for the three expert validators. (5) Data analysis techniques: The data obtained is analyzed using descriptive statistical data analysis techniques using Likert scale measurements. The Likert scale helps determine attitudes and perceptions of specifically determined social facts, which are ultimately referred to as research variables (Sugiyono, 2015).

The fifth step is evaluation, a comprehensive process in which product deficiencies are thoroughly evaluated and will be improved according to the input obtained from the three experts and trial subjects. This thorough evaluation process ensures the highest quality of the product. Evaluation is carried out to determine the feasibility of the product. It will also explain the advantages and disadvantages of learning products for basic techniques of basketball games based on the I-spring application.

Data Analysis

The quantitative descriptive analysis data is processed using a formula that refers to Akbar & Sriwiyana (2011). This formula is not just any formula but has been proven reliable. Furthermore, to determine the data from the analysis results to be categorized appropriately with the score obtained, the researcher refers to the classification of data belonging to Akbar & Sriwiyana (2011) as below. This data classification is not just any classification but one we can trust.

Table 1. Product Quality Criteria

Criteria	Description	Meaning
75,01%-100,00%	Perfectly Valid	Used without revision
50,01%-75,00%	Fairly Valid	Used with minor revisions
25,01%-50,00%	Invalid	Unusable
00,00%-25,00%	Strongly Invalid	Forbidden to use

The data obtained is analyzed using descriptive statistical data analysis techniques, with a particular emphasis on the use of Likert scale measurements.

These measurements provide a reliable and comprehensive analysis of the data, ensuring the confidence of the audience in the evaluation process.

Table 2. Rating Scale for Positive Statement

No	Category	Answer	Positive Score
1.	Strongly Agree	A	4
2.	Agree	B	3
3.	Doubtful	C	2
4.	Disagree	D	1

(Source: Sugiyono, 2015)

RESULTS

The research results are in the form of learning media applications designed with I-spring software. This application media has several menus: KI and KD, material, videos, quizzes, biodata, and a reference list. This learning media includes basketball game learning materials for the Senior High School level, which are concise and presented in an interesting manner, keeping the audience engaged and excited. The following will present an overview of the learning media product for basic basketball technique material.

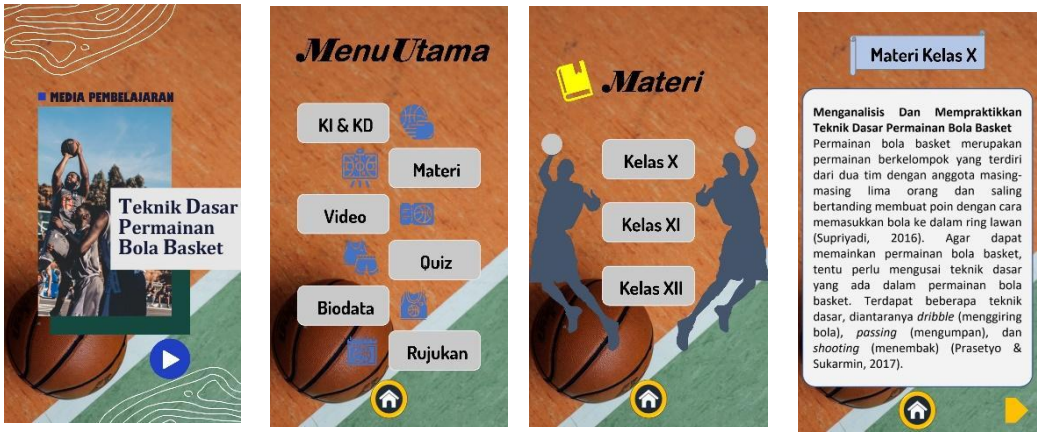

Figure 2. Application Product Menu Display

Data from expert validation and small and large group trials will be presented in two forms, namely tables and diagrams.

Table 3. Media Expert Validation Analysis Results

Aspects	Feasibility	Remarks
Attractiveness	95%	Perfectly Valid
Suitability	100%	Perfectly Valid
Clarity	93,8%	Perfectly Valid
Precision	100%	Perfectly Valid
Ease of use	100%	Perfectly Valid

Experts in validation media analysis (Table 3) showed that the development of Ispring-based basketball learning media was considered to have two qualifications, which were good, with a score of 97.5% because the percentage result obtained was greater than 90%. When averaged, these five dimensions received ratings above 93%, giving evidence that the media is visually attractive, pedagogically suitable, technically accurate, and easy to use. These findings supported that, to a certain degree, the product meets experts' expectations about the quality of a digital instructional tool, and it is considered feasible for use in the teaching and learning of physical education with no significant modifications.

Table 4. Learning Expert Validation Analysis Results

Aspects	Feasibility	Remarks
Suitability	100%	Perfectly Valid
Clarity	92,9%	Perfectly Valid
Ease of use	87,5%	Perfectly Valid
Precision	100%	Perfectly Valid
Effectiveness	100%	Perfectly Valid
Validity	95%	Perfectly Valid

The validation results from learning experts (Table 4) show that the learning media obtained an average score of 95%, which is included in the perfectly valid category. The aspects assessed include material suitability, clarity of presentation, ease of use, content accuracy, effectiveness, and validity, all of which scored above 87%. This shows that the media has met the standards of good learning quality, by curriculum objectives, easy for students to understand, and effective for use in the PJOK learning process, especially basketball material.

Table 5. Basketball Expert Validation Analysis Results

Aspects	Feasibility	Remarks
Clarity	75%	Valid
Precision	75%	Valid
Attractiveness	75%	Valid
Validity	75%	Valid

Based on the validation results from basketball material experts (Table 5), the learning media obtained an average score of 75%, which is included in the valid category. The aspects assessed include clarity of material, accuracy of technique, attractiveness of display, and overall content validity. Although it does not reach the "very valid" category, this result shows that the media is based on the basic principles of basketball game techniques. It can be used in learning with minor improvements according to input from validators, especially to improve the accuracy of technical content and visualization of movements.

Table 6. Small Group Trial Analysis Results

Aspects	Feasibility	Remarks
Attractiveness	85,8%	Perfectly Valid
Suitability	85,5%	Perfectly Valid
Clarity	80%	Perfectly Valid
Precision	82,5%	Perfectly Valid
Ease of use	86,3%	Perfectly Valid
Validity	85,2%	Perfectly Valid

The results of the small group trial (Table 6) show that the I-spring-based learning media obtained an average score of 85.2%, which is categorized as perfectly valid. The assessment includes attractiveness, suitability of material, clarity of display, accuracy of information, ease of use, and overall validity. This value indicates that the media is well received by students and is considered adequate and easy to use in understanding basic basketball technique material, making it feasible to proceed to a wider trial stage.

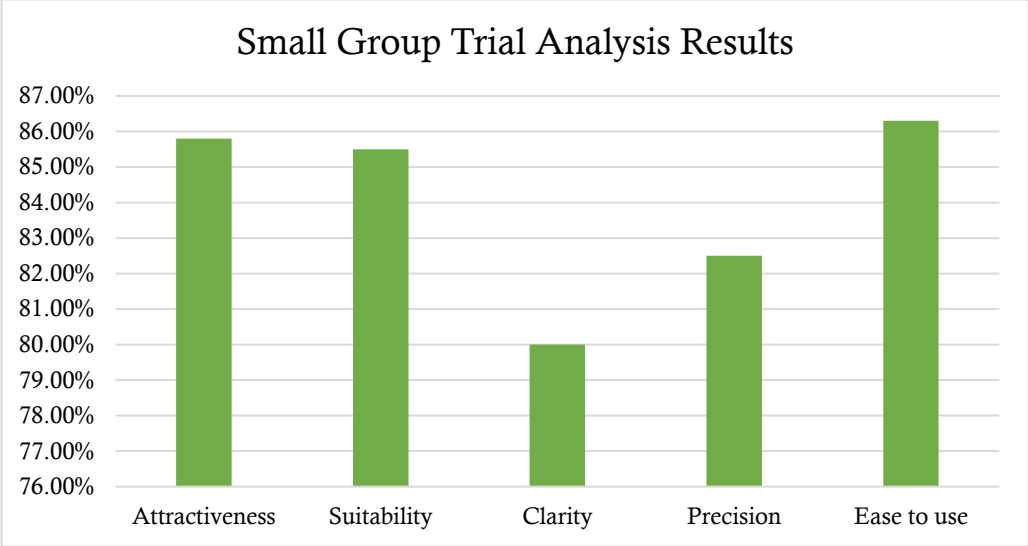

Figure 3. Small Group Trial Analysis Results

The results of the small group trial data analysis above show a percentage of 85.2%, which is then converted based on the assessment category and shows that the product is in the perfectly valid category.

Table 7. Big Group Trial Analysis Results

Aspects	Feasibility	Remarks
Attractiveness	88,2%	Perfectly Valid
Suitability	86%	Perfectly Valid
Clarity	82,5%	Perfectly Valid
Precision	84,2%	Perfectly Valid
Ease of use	85%	Perfectly Valid
Validity	85,2%	Perfectly Valid

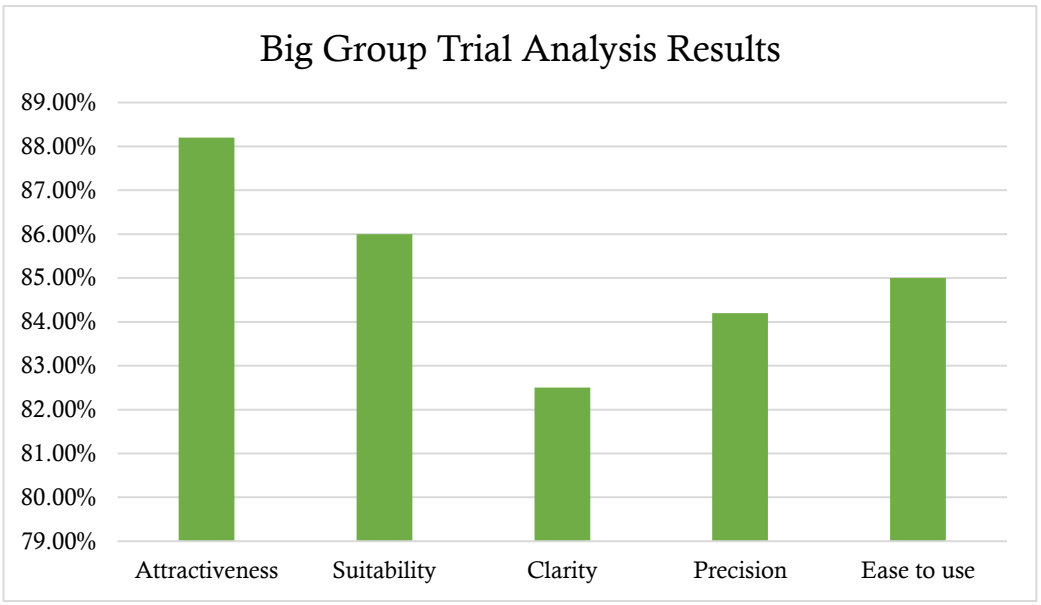

Figure 4. Big Group Trial Analysis Results

The analysis data from the large group trial above shows a percentage of 86.4% which is then converted based on the assessment category and shows that the product is classified as perfectly valid.

DISCUSSION

The media products developed in this study have shown high relevance to the needs of learning in the digital era. Using digital media as learning aids provides greater flexibility and accessibility for learners. However, it is important to recognize that this study has some limitations that must be considered before interpreting and applying the results.

In digital education, interactive media such as I-spring is highly relevant. Digital media allows learning to be more flexible, accessible, and adaptive to the characteristics of students familiar with technology. It also contributes to building students' motivation and interest in learning through visual and interactive approaches that align with 21st-century learning principles (Novita & Harahap, 2020; Chan, 2019). In addition, I-spring allows teachers to develop systematic teaching materials that can be adapted to the class's needs, supporting the blended learning approach (Dziuban et al., 2018).

This learning media product will be used in learning at State Senior High School 1 Gondanglegi; the product is expected to help the learning process, considering that interactive media can influence success in increasing the quality of student learning (Mahnun, 2020). Learning media is an integral part and unites the learning methods used. An example of media that can be concretized is Android-based media (Kuswanto & Radiansah, 2018). Learning by using media can improve learning outcomes; it can also help the role of educators and provide more learning opportunities for students (Dziuban et al., 2018). Learning media is an element in the learning environment that stimulates students to learn more and create quality learning (Mu'arifuddin, 2018). This basketball game learning media has received a good assessment and has an easy installation process.

In modern education, learning media plays an important role in learning and controls learning outcomes by the objectives (Wijaya et al., 2019). Application-based learning media is a new idea to make teaching materials attractive, efficient, and systematic. The completeness of teaching materials can affect learning objectives, learner characteristics, and learning situations (Heynoek et al., 2022). Therefore, learning media must develop to be relevant to its era and suitable for today's students. The characteristics of the media must now be adapted to the characteristics of the students, where students in the current era cannot be separated from the High school. Therefore, media developers need to adjust and pay attention to this to facilitate the achievement of learning objectives and make learning more structured (Ashfahany Adi, & Hariyanto, 2017). Learning media that is engaging, easily accessible, and important can be accepted by students and facilitate learning is relevant media today (Nurrita, 2018).

Media expert validation data obtained a good presentation, and it can be concluded that the media is good enough and can be used to assist learning. Meanwhile, the media can also be used as a stimulus to foster student responses to follow learning optimally (Baharun, 2016). Application-based learning media has three advantages that assist the learning process, namely as an optional substitute and complementary supplement. In this era, the demand for information technology in learning is high, preparing students for an era where technology is growing rapidly (Novita & Harahap, 2020).

The use of android-based media is also important in learning PJOK, which is based on much practice; here, the media plays a role in presenting reading material

and practice videos that can be accessed at anytime, anywhere, so that learning can be done effectively (Ayu & Pratiwi, 2021). The combination of direct learning in the field and independently is compelling enough to break down student learning for good results (Albhnsawy & Aliweh, 2016). Using application-based media makes learning complex and requires significant effort and funds to create media that can bring about the expected changes, such as improved understanding and retention of the material (Lalima & Lata Dangwal, 2017). The next step that needs to be considered is selecting the type of media that needs to be adjusted to the objectives to be realized in the learning process (Kurniawan, Surya, & Kurniawan, 2022). In basketball game material, the role of media is more inclined to present material in the form of videos that help students to be able to analyze each basic technique movement, including passing, dribbling, and shooting movements. In order to be able to master the basic techniques of basketball games to the maximum, a gradual learning model is needed, from easy to difficult. In this media, learning will be presented by KD and KI at each level to facilitate students learning.

Learning media I-spring application basketball material development results can be downloaded and installed on the phone easily. The media can be used online or offline. The application also presents a menu in the form of KI and KD, material, videos, quizzes, developer bios, and reference lists. In the material menu, learning materials presented by KD and KI in high school learning are presented briefly and clearly. In the video section, learning videos are presented as an analysis of basic basketball techniques for class X, an analysis and improvement for class XI, and an analysis of class XII's attack and defense patterns. The quiz section presents evaluation questions according to their respective levels and a direct assessment of work results. The creation of this application-based media product is expected to make it easier for students to learn to master the basic techniques of basketball games. It can make learning more interesting and compelling so students are more enthusiastic about learning.

Limitations of the study

One of the main limitations is the lack of a strong theoretical foundation in developing and evaluating digital media. The study by Perez, Manca, Fernández-Pascual, & Mc Guckin (2023) shows that many studies on social media integration in education are not based on a solid learning theory framework, which may lead to a superficial understanding of the pedagogical benefits of social media in learning and teaching. Therefore, this study must strengthen its theoretical basis to ensure digital media integration supports learning objectives.

In addition, this study has not explicitly addressed the policy implications of using digital media in education. Technology integration in learning requires clear policy support, including teacher training, technology infrastructure, and adaptive curriculum. As Koehler & Mishra (2009) point out, TPACK frameworks often overlook broader systemic factors that affect teaching quality, such as access to professional development and resources necessary for effective technology integration.

The theoretical implications of this study also need to be expanded. The use of digital media in learning impacts teaching practices and challenges traditional learning theories. For example, social constructivism theory emphasizes the importance of social interaction in learning, which digital media can facilitate.

However, this study has not fully explored how digital media can support or change the dynamics of social interaction in learning contexts.

For future research, it is recommended to adopt a more holistic approach by considering relevant learning theoretical frameworks and policy implications supporting digital media integration in education. This approach will help us understand more deeply how digital media can effectively improve learning outcomes and support educational transformation in the digital era.

CONCLUSIONS

The development of application-based basketball learning media using spring conducted at the State Senior High School 1 Gondanglegi obtained quite good results, with the analysis of small group and large group trials can be categorized as very valid. Based on the data obtained, the overall product can be declared feasible to learn Physical Education Sports and Health basketball material for the Senior High School level at the State Senior High School 1 Gondanglegi. Researchers present basketball game learning media in a general and simple way, ensuring that it is accessible and easy to understand for all. It still does not cover all the basic techniques in basketball. The researchers hope that the next researcher can perfect this research by completing the basic techniques in basketball and presenting a varied training model as well as diverse defense patterns and attack patterns. PE teachers are encouraged to integrate I-spring-based media into their lessons. Further research is recommended to explore effectiveness across different subjects and student populations.

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DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request. Due to institutional policies and participant privacy considerations, the raw data (including student responses and validation forms) are not publicly shared but can be accessed anonymously for academic purposes.

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CONFLICT OF INTEREST

The author officially certifies that there are no conflicts of interest with any party with respect to this research.

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