



DEVELOPMENT OF PLAYING EDUCATION FOOTBALL MULTIMEDIA TO IMPROVE LEARNING OUTCOMES IN FOOTBALL THEORY AND PRACTICE

I Made Satyawan^{1*}, I Wayan Lasmawan², I Wayan Artanayasa³, Ketut Chandra
Adinata Kusuma⁴, I Dewa Made Aryananda Wijaya Kusuma⁵, Yovhandra Ockta⁶

^{1,2,3,4}Universitas Pendidikan Ganesha, Singaraja, Indonesia

⁵Universitas Negeri Surabaya, Surabaya, Indonesia

⁶Universitas Teuku Umar, Aceh, Indonesia

*Corresponding Author:  made.satyawan@undiksha.ac.id

Article History

Received : 20/04/2025

Revised : 24/05/2025

Accepted : 20/06/2025

Keywords:

Multimedia, Playing
education, Football,
Football learning,
Learning outcomes.

Abstract. The limited availability of multimedia resources in football science, coupled with a lack of innovation and updates in the learning materials, significantly impacts student motivation and learning outcomes. Furthermore, there are several factors influencing learning results, such as learning motivation, student comprehension, available learning facilities, and the media employed by lecturers during teaching. One of the strategies to be implemented in learning is the use of interactive multimedia in the Football Practice Theory course to boost student motivation and improve learning outcomes. The aim of this research is to develop football multimedia for Physical Education (PE) in the context of Football Practice Theory. This study also examines the feedback from both lecturers and students regarding the development of PE football multimedia in Football Practice Theory. The research follows a Research & Development (R&D) approach, utilizing the ADDIE development model, which includes the following steps: A for Analysis, D for Design, D for Development, I for Implementation, and E for Evaluation. The validity tests conducted by content experts, as well as media and design experts, resulted in an average score of 1.00, categorizing it as very good. The effectiveness of the multimedia, based on the N-Gain calculation, was 0.78, indicating its effectiveness. The N-Gain value was derived from the difference in average pre-test and post-test scores. Student feedback resulted in an average score of 67.5, categorized as very valid, while lecturer feedback yielded an average score of 47, also categorized as very valid. Based on all the evaluations conducted on the PE football multimedia in Football Practice Theory, the developed multimedia is deemed appropriate as a learning resource for enhancing student motivation and learning outcomes.

How to Cite: Satyawan, I. M., Lasmawan, I. W., Artanayasa, I. W., Kusuma, K. C. A., I Dewa Made Ariananda Wijaya Kusuma, I. D. M. A. W., & Ockta, Y. (2025). DEVELOPMENT OF PLAYING EDUCATION FOOTBALL MULTIMEDIA TO IMPROVE LEARNING OUTCOMES IN FOOTBALL THEORY AND PRACTICE. *Prima Magistra: Jurnal Ilmiah Kependidikan*, 6(3), 283-292. <https://doi.org/10.37478/jpm.v6i3.5578>

Correspondence address:

Jalan Udayana No.11 Singaraja - Bali 81116.

 made.satyawan@undiksha.ac.id

Publisher:

Program Studi PGSD Universitas Flores. Jln. Samratulangi,
Kelurahan Paupire, Ende, Flores.

 primagistrauniflor@gmail.com

INTRODUCTION

Education is understood as a deliberate effort to create conducive learning environments that enable students to actively nurture their potential (Alam & Mohanty, 2024). This process aims to cultivate self-discipline, personal growth, spiritual and religious values, moral integrity, intelligence, and the necessary skills that benefit the individual, society, the nation, and the state (Donna et al., 2021). Education plays a crucial role in motivating individuals to enhance their quality of life, especially in today's era, where rapid advancements in information and communication technology are taking place (Haleem et al., 2022). The swift progress of these technologies has ushered in a transformative era across various sectors, with education being one of the areas most impacted by this change (Muchtar & Suryani, 2019). The Physical Education, Health, and Recreation program at Universitas Pendidikan Ganesha includes a mandatory course in the second semester titled *Theory of Football Learning Practice*. This course encompasses a range of topics, including the history and evolution of football, fundamental and advanced techniques, training methods, playing strategies, rules, refereeing, organizing football matches, and skill assessments in football education. The overarching goal of the course is to equip students with the skills needed to design, implement, and evaluate

football learning experiences that are inspiring, creative, innovative, engaging, and motivating. In the realm of sports, enhancing the physical abilities of athletes is a key foundation for improving overall athletic performance (Dharmadi et al., 2021). Sufficient endurance is a crucial factor for success in football, whether at the professional or amateur level (Szymanek-Pilarczyk, 2024). Alongside physical improvements aimed at enhancing learning outcomes, it is equally important to expand learning resources to boost student performance.

The rapid advancements in science and technology have brought about changes in many aspects of life, including education and employment, which in turn impact the competencies of university graduates. One approach to address these changes is to focus on fostering student excellence and preparing them to adapt to socio-cultural transformations, technological innovations, and industrial progress. Learning outcomes and student competencies are interconnected in a dialectical and symbiotic manner, as the foundation of the educational process—particularly curriculum design—must be continuously developed to remain dynamic and relevant in daily life. Insufficient learning resources, a lack of innovation, and outdated learning content can hinder the achievement of optimal student learning outcomes (Satyawan et al., 2023). This situation motivates educators to become more creative and innovative in using learning media to enhance the knowledge and skills imparted to students (Chandra et al., 2022). This can be traced back to ineffective teaching methods, materials, and techniques used in delivering the subject matter (Arfi et al., 2024). The poor learning outcomes of students in the educational process can be attributed to educators not using media that aligns with students' needs, particularly IT-based learning tools (Hasri et al., 2023). An effective strategy to boost both learning motivation and outcomes is the use of interactive multimedia, which can significantly enhance student engagement and achievement.

Firstly, interactive multimedia enhances the learning experience by presenting content in various formats like text, images, audio, and video, and incorporating interactive elements such as quizzes, simulations, and games. This makes the learning process more engaging and encourages greater student involvement. Secondly, it allows students to grasp concepts in a more visual, audiovisual, and interactive manner, which aids in better understanding and strengthens the links between the material being taught. Thirdly, interactive multimedia provides students with the flexibility to learn at their own pace and according to their unique learning preferences. They can revisit challenging material, explore topics in more depth, and access content as needed, promoting independent learning. Fourthly, it offers immediate feedback through quizzes, games, or other interactive exercises, enabling students to track their progress and pinpoint areas needing improvement, thus motivating them to keep learning. Lastly, interactive multimedia fosters collaboration among students, whether in a physical classroom or through online platforms.

This research was conducted due to problems identified in the Theory and Practice of Football Learning course at the Physical Education, Health, and Recreation Department of Universitas Pendidikan Ganesha. The main issue is the low student learning outcomes, caused by the use of conventional, non-interactive, and outdated learning media that fail to meet students' current learning needs. This problem has not yet been fully resolved, as most learning activities still rely on traditional methods that lack technological integration and student engagement. The position of this research is to develop an interactive multimedia-based learning tool using the PE (Playing Education) approach. This development aims to enhance students' motivation, theoretical understanding, and practical football skills, offering a concrete solution to the identified issues and supporting improved learning quality. The interactive multimedia developed will utilize the Smart Apps Creator (SAC) application, which allows for the integration and synergy of various media forms, such as text, images, graphics, audio, video, animation, and interactivity (Aisah & Richpeace, 2025; Wahyuni et al., 2023). This approach ensures that students not only observe the media but also actively engage with it during the learning process. Smart Apps Creator (SAC) is a platform designed to create Android-based learning applications without the need for complex coding or programming, producing outputs in formats like HTML5 and exe (Watin et al., 2023). This tool enables educators to design



engaging and effective learning experiences that can even be used offline, without requiring an internet connection. By integrating interactive multimedia based on Smart Apps Creator, the learning process is expected to undergo significant improvements. Interactive multimedia, as a technological tool, offers numerous advantages in education, supporting the delivery of lessons and serving as a valuable learning resource. Additionally, it acts as a medium to store and communicate information to students. The use of interactive multimedia in education is aimed at supplementing and assisting instructors in presenting course content. Research findings also suggest that the use of Android-based learning games, facilitated by the Smart Apps Creator 3 application, is effective in improving student learning outcomes (Sutrisni et al., 2022). Similarly, a study by Muzakkir et al. (2022) concluded that smartphone-based interactive multimedia for limited face-to-face mathematics instruction falls into the effective category in terms of its effectiveness.

Based on this, using ICT-based media in learning facilitates interactions between students and the media, students and lecturers, as well as between students themselves, helping to achieve the desired learning outcomes. With the ongoing advancements in technology and the growing need for relevant learning materials, media has evolved into more engaging interactive multimedia that captures students' attention. Similar results have been observed in volleyball education, where a significant difference was found in the effectiveness of the interactive multimedia-based learning model compared to traditional teaching methods. This approach proved to be more effective in enhancing students' basic technical skills in volleyball (Gunawan et al., 2019).

Several previous studies have shown that interactive multimedia can effectively improve student learning outcomes. For example, Hasrullah et al. (2024) found that Android-based learning games developed using Smart Apps Creator significantly enhanced student achievement. Similarly, Hermansyah & Widyawati (2024) demonstrated the effectiveness of smartphone-based multimedia in mathematics instruction, while Samsuddin et al. (2022) reported that interactive multimedia was more effective than traditional methods in volleyball education. However, these studies focus on different subjects and contexts. This research specifically develops interactive multimedia for football education using the PE (Playing Education) approach, addressing a gap in engaging, technology-based learning media for football theory and practice. The study aims to create an innovative tool that improves student motivation, understanding, and practical skills. The expected benefits include providing educators with effective teaching media and supporting students in achieving better learning outcomes through interactive and flexible learning experiences.

RESEARCH METHODS

Multimedia is a blended combination of digitally enhanced text, images, graphic art, sound, animation, and video. When the user, or viewer, is given control over how and when these elements are presented, it is referred to as interactive multimedia (Vaughan, 2011). In conclusion, multimedia is an integration of various forms of media, including text, images, sound, animation, video, and more, combined in a cohesive and synergistic way through computers or other electronic devices to achieve specific objectives. Interactive media can be used to deliver learning content such as text, graphics, audio, and moving images. The use of computer-based interactive multimedia in learning can take the form of drills, tutorials, simulations, and games. The multimedia-based Physical Education (PE) Football program was developed using an Android application called Smart App Creator. By incorporating Android-based interactive devices and multimedia, students can experience more effective learning, which in turn enhances their learning outcomes (Mustika et al., 2023). The use of android-based interactive multimedia was intended to facilitate the teaching and learning process, both in terms of receiving material and completing assignments by students, as well as in terms of giving scores or scores by lecturers on student work. That Interactive Multimedia Applications as learning media have been well tested, very practical and very effective in the learning process (Ockta et al., 2024). This research used a research and development (R&D) approach, that is a



type of research that aims to develop certain products and assess their success and effectiveness (Sugiyono, 2017). In this research, the product developed is multimedia PE (Playing Education) Football on Theory of Football Learning Practice.

This research uses the ADDIE development model which includes five stages: Analyze, Design, Development, Implementation, and Evaluation. This model is designed with structured steps to systematically address learning problems, as well as adapt learning resources to learning needs and characteristics. Every phase in the ADDIE model includes an evaluation process. The subjects of this study are as follows: (1) Subjects for Expert Validity consisting of 10 experts, namely: 1 expert in research instrument validation from Undiksha with a Ph.D. in Research and Evaluation of Learning; 3 design experts from Undiksha with Ph.D. qualifications in instructional media/ICT; 3 content/material experts from Undiksha with Ph.D. qualifications in physical education; and 3 media experts from Undiksha with Ph.D. qualifications in educational technology; (2) Subjects for Practicality Testing consisting of 10 lecturers from the The study involved participants from the Physical Education, Health, and Recreation Department at Undiksha (Universitas Pendidikan Ganesha) and 20 students from the Physical Education Study Program at the Faculty of Sports Science, Undiksha. The effectiveness testing was conducted with 40 students from the same program who were enrolled in the Football Learning course. This research collected both qualitative and quantitative data. The qualitative data included suggestions, feedback, and comments gathered from responses to questionnaires completed by experts, during practicality testing, and small group trials. The quantitative data consisted of the scores from the questionnaires completed by both the experts and students. The methods of data collection used in this study are outlined in Table 1.

Table 1. Data Collection Techniques

No	Data Type	Method	Data Source
1	Information about learning resources used	Discussion/Interview	Lecturers of the Football Learning Theory and Practice course
2	Validity of Multimedia PE Football	Questionnaire Distribution	Content/material experts, Media experts, Design experts
3	Responses from lecturers and students regarding Multimedia PE Football	Questionnaire Distribution	Lecturers and students from the Physical Education, Health, and Recreation Study Program
4	Effectiveness of Multimedia PE Football	Test/Questionnaire Distribution	Students enrolled in the Football Learning Theory and Practice course

The data analysis regarding the validity of the interactive multimedia aims to assess how well the content aligns with the predetermined criteria, based on evaluations from pre-selected validators. The validity of the interactive multimedia is assessed through content/material expert testing, design expert testing, and media expert testing. The evaluation results in expert testing are calculated using the Lawshe CVR and CVI formulas. The criteria for the expert validation levels (Septiari et al., 2020) are presented as shown in Table 2.

Table 2. Criteria for Expert Test Validation Level

Validity Coefficient	Validity Level	Criteria
0.91 - 1.00	Very High	Highly Valid
0.71 - 0.90	High	Valid
0.41 - 0.70	Moderate	Sufficiently Valid
0.21 - 0.40	Low	Less Valid
0.00 - 0.20	Very Low	Very Invalid

The validation process, which includes practicality testing, was conducted with 20 students and 10 lecturers from the Physical Education, Health, and Recreation Department of Undiksha. The minimum and maximum scores for each variable were determined based on the number of items and the available rating scale on each questionnaire. These raw scores were then converted to a scale of 100. The quality of each data variable was described based on the conversion results for each variable. The conversion guidelines for the practicality test in this study use the Criterion-Referenced Assessment (CRA), which is presented in Table 3.



Tabel 3. CRA Conversion Guidelines

No	Percentile Score Range	Category
1	90-100	Very Practical
2	80-89	Practical
3	65-79	Sufficiently Practical
4	40-64	Less Practical
5	0-39	Very Impractical

For the small group test data, it was obtained from 30 students, consisting of 15 students in the experimental group and 15 students in the control group. The data collected were analyzed using a t-test. Prior to conducting the t-test, prerequisite tests for normality and homogeneity were performed. Decision-making was carried out by comparing the obtained significance value with the 5% significance level. To determine the effectiveness of the product, an evaluation was conducted using a large group test with an experimental design, involving a sample size of 40 students, consisting of 20 students in the experimental group and 20 students in the control group. The data obtained from the large group test were analyzed using a t-test, but prerequisite tests were first conducted using the Kolmogorov-Smirnov test to assess normality and Levene's Test of Equality of Error Variances to test for homogeneity of variance. The decision-making was done by comparing the obtained significance value with the 5% significance level.

RESULTS AND DISCUSSION

The development of multimedia PE (Playing Education) Football for the Football Learning Course was carried out following the Dick and Carey model, consisting of 10 stages. The first stage is needs analysis, which revealed that the course lacked engaging and motivating learning media. The teaching mainly relied on textbooks, PowerPoint presentations, and videos created by the instructor, leading to student boredom. Based on this analysis, multimedia PE (Playing Education) Football was developed to enhance student motivation. The second stage is learning analysis, which showed that students were less engaged and the instructor struggled to develop creative learning media. Survey results indicated that students preferred interactive multimedia, which made learning more interesting. The third stage involved analyzing the learners and their environment, revealing that football contributed to the development of interpersonal skills and discipline among students. In the fourth stage, learning objectives were formulated based on the Course Syllabus and competency standards. The fifth stage involved developing assessment instruments to evaluate the multimedia's feasibility. In the sixth stage, learning strategies were designed, and in the seventh stage, multimedia was developed using the Smart Apps Creator application. Formative evaluation was conducted in the eighth stage to assess the quality and effectiveness of the media, while the ninth stage involved revisions based on expert feedback.

Finally, in the tenth stage, summative evaluation was performed to test the media's feasibility before conducting small and large group trials. The results of validity and effectiveness tests showed that multimedia PE (Playing Education) Football is effective in supporting football learning. The results of the validity test and the responses of students and lecturers can be seen in Table 3 and the product effectiveness test can be seen in Tables 4 and 5. The final results of the development of interactive multimedia PE (Playing Education) Football model Dick and Carey in the football learning TP course are presented in Table 4,5,6.

Tabel 4. Validation Results of the Interactive Multimedia Product PE (Playing Education) Football

No	Test Subject	Validity Results (%)	Information
1	Content/learning material test	97	Very Valid
2	Design test	90	Very Valid
3	Media test	94	Very Valid
4	Lecturer practicality test	93.85	Very Practical
5	Student practicality test	92.19	Very Practical



Table 5. Small Group Test Results

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
HB	Equal variances assumed	0.744	0.396	3.101	28	0.004	1.667	0.537	0.566	2.768
	Equal variances not assumed			3.101	25.74	0.005	1.667	0.537	0.561	2.772

According to Table 5, the Sig. (2-tailed) values are all less than 0.05 ($0.004 < 0.05$). Thus, it can be concluded that the interactive multimedia PE (Playing Education) Football used in football lessons is effective in improving students' learning outcomes.

Table 6. Large Group Test Results

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
HB	Equal variances assumed	0,003	0,958	3,226	38	0,003	1,600	0,496	0,596	2,604
	Equal variances not assumed			3,226	37,69	0,003	1,600	0,496	0,596	2,604

As shown in Table 6, the Sig. (2-tailed) values are all less than 0.05 ($0.003 < 0.05$). This indicates that the interactive multimedia PE (Playing Education) Football used during football lessons is effective in enhancing students' learning outcomes. The outcomes of this research development can be observed in the [Figure 1](#).

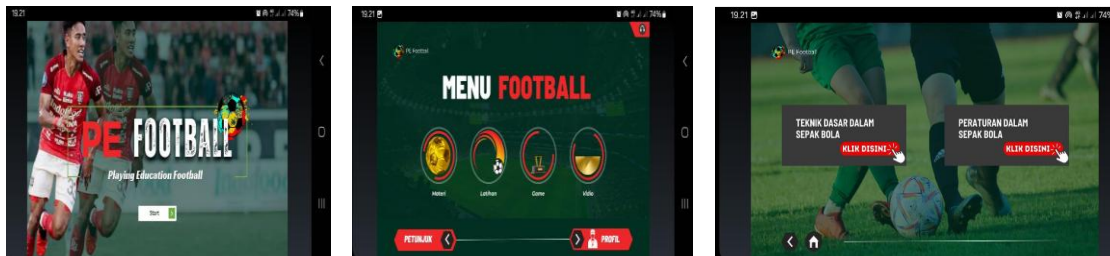


Figure 1. Multimedia Development Output PE (Playing Education)

The development of the PE (Playing Education) Football multimedia in the context of football learning within the Physical Education study program has made a significant contribution to enhancing the learning experience of students. This discussion aims to evaluate the implications, challenges, and potential for further development of this multimedia. Firstly, the success of using the Smart App Creator application in developing this interactive multimedia demonstrates great potential in providing an innovative and engaging approach to learning. By utilizing the right technology, such as this application, football learning not only becomes more interesting but also more effective in facilitating the understanding of key concepts. Secondly, the involvement of lecturers in the development process of this multimedia has been a key factor in its success. The support and collaboration from lecturers with expertise in related subjects ensure that the multimedia content aligns with the curriculum requirements and enriches the student learning experience. However, despite the great potential of this multimedia, several challenges were encountered during its development. One of the challenges was the availability of sufficient resources, including time and technical expertise, to produce

high-quality multimedia. Additionally, attention must be given to potential technical barriers or compatibility issues with devices used by students. This discussion also opens up opportunities for further development of the PE Football multimedia. For example, integrating additional features such as interactive quizzes or virtual training simulations could further enrich the learning experience. Furthermore, collaboration with football experts and practitioners could help ensure that the content remains relevant and impactful in developing students' understanding and skills in football. The urgency of this research is that it supports the shift from traditional learning approaches to more interactive and engaging learning. With advancing technology, interactive multimedia has become one of the ways to integrate more dynamic and attractive approaches into the learning process. The research proves that the use of interactive multimedia can increase student engagement in learning. This is important because higher engagement levels can motivate students to learn better and stay more focused. Interactive multimedia can also This approach aids students in grasping the material more effectively by incorporating visual, audio, and interactive elements. The study highlights how multimedia can simplify the communication of complex concepts, making them more accessible, while also enhancing student motivation and improving learning outcomes.

Overall, the development of the PE Football multimedia shows great potential in enhancing football learning within the PJKR environment. With continued careful evaluation and development, this multimedia can become an effective and innovative learning tool in supporting students' understanding and development of football skills. Similar research conducted by Satyawan et al. found that the application of interactive multimedia in football theory and practice learning is already considered effective (Satyawan et al., 2023). The research conducted by Arif Desramaza et al. found that the results obtained in this study show that the Project-Based Learning (PjBL) learning media, assisted by the Smart Apps Creator application, has met the valid and practical criteria (Desramaza et al., 2023). The research conducted by Muhammad Ilman Abi concluded that the mobile application Abiapps for the Android platform, which was developed, received a "very valid" category for application in the learning process. Based on the feasibility table, this application is considered beneficial and suitable for introduction to high school students (Ilman Abi & Sujatmiko, 2022). The next study resulted in a history learning media developed using the Smart App Creator 3 (SAC) application was evaluated by subject matter and media experts, and it met the standards for being effective and appropriate for use. Furthermore, the results from a large-group trial yielded high ratings, confirming the media's suitability for educational purposes teaching (Saputro & Miftahuddin, 2024).

The development of the PE (Playing Education) Football multimedia has significant implications for enhancing football learning within the Physical Education study program. By integrating interactive technology through the Smart Apps Creator platform, this multimedia tool offers a more engaging and effective learning experience that can improve students' understanding of football theory and practical skills. The involvement of lecturers in content development ensures alignment with curriculum standards, enhancing the relevance and quality of the learning material. Furthermore, this research supports the ongoing educational shift towards interactive and technology-enhanced learning environments, which have been shown to increase student motivation, engagement, and ultimately, learning outcomes. However, there are several limitations to consider. The development process requires substantial time, technical skills, and resources, which may not always be readily available to all educators or institutions. Additionally, technical challenges such as device compatibility and varying levels of digital literacy among students can hinder the optimal use of the multimedia. The study's scope was also limited to the football learning course at a single university, which may affect the generalizability of the findings to other subjects or educational settings. Based on these considerations, several recommendations are proposed for future research and development. First, further enhancement of the multimedia should include additional interactive features such as quizzes, virtual simulations, and gamified assessments to deepen student engagement and skill mastery. Collaboration with football experts and practitioners is encouraged to



continuously update and validate content relevance. Expanding usability testing across diverse educational contexts and student groups can help improve adaptability and accessibility. Finally, capacity building for educators in multimedia development and digital pedagogy is essential to support the sustainable integration of such technologies into curricula. While the PE Football multimedia demonstrates strong potential as an innovative educational tool, ongoing development, evaluation, and support are necessary to maximize its effectiveness and impact.

CONCLUSIONS AND SUGGESTIONS

The development of the PE (Playing Education) Football multimedia for the Football Learning Theory and Practice course at Ganesha University of Education's Physical Education study program has introduced an innovative and engaging approach to teaching. Using the ADDIE model (Analyze, Design, Development, Implementation, Evaluation), the multimedia was developed through a systematic and structured process. The study shows that interactive multimedia, based on the Smart App Creator application, significantly improves students' understanding of football concepts and enhances their learning performance. The product includes diverse content such as videos, presentations, and interactive simulations, validated through expert evaluations and multiple trials with students. Feedback from both lecturers and students indicates that the PE Football multimedia not only facilitates more effective learning but also meets the needs and characteristics of students in physical education. The product was praised for its ability to engage learners and make football theory more accessible and enjoyable.

However, there are opportunities for further improvement. To increase engagement, features such as interactive quizzes, virtual training simulations, or gamification could be added. Furthermore, the inclusion of real-time feedback systems would enable students to track their progress and receive immediate suggestions for improvement. Expanding accessibility through a mobile application version would cater to the growing use of smartphones for learning. Integrating this multimedia into Learning Management Systems (LMS) like Moodle or Google Classroom could also streamline content delivery. Additionally, collaborating with football institutions or professionals could enrich the content and provide students with real-world expertise. Overall, this study demonstrates that the integration of multimedia technology in football education can improve both learning effectiveness and student involvement. With continued refinement and development, this multimedia has the potential to become a valuable educational tool, enhancing physical education curricula in the future.

REFERENCES

- Aisah, M. Y., & Richpeace, C. A. D. (2025). Development of Learning Multimedia to Make Digital Tunic Patterns Based on SAC (Smart App Creator) for Vocational High School Students. *Jurnal Eduscience (JES)*, 12(1), 126–135. <https://jurnal.ulb.ac.id/index.php/eduscience/article/view/6538>
- Alam, A., & Mohanty, A. (2024). Integrated constructive robotics in education (ICRE) model: a paradigmatic framework for transformative learning in educational ecosystem. *Cogent Education*, 11(1). <https://doi.org/10.1080/2331186X.2024.2324487>
- Arfi, J., Wahyuri, A. S., Gusril, G., Rasyid, W., & Ockta, Y. (2024). Developing Engaging Audio-Visual Learning Media For Basic Locomotor Patterns Through Play-Based Activities For Early Learners. *Journal of Education, Teaching, and Learning*, 9(1), 40–46. <https://journal.stkip Singkawang.ac.id/index.php/JETL/article/view/5922>
- Chandra, K. C. A. K., Artanayasa, I. W., & Sukmana, A. I. W. I. Y. (2022). The validity of D-MENBOLA: Digitalization of football learning media based on articulate storyline 3. *Journal Sport Area*, 7(1), 23–32. [https://doi.org/10.25299/sportarea.2022.vol7\(1\).7370](https://doi.org/10.25299/sportarea.2022.vol7(1).7370)
- Desramaza, A., Sufri, & Pasaribu, F. T. (2023). Desain Media Pembelajaran Berbasis Project Based Learning Berbantuan Smart Apps Creator. *Pedagogy: Jurnal Pendidikan Matematika*, 8(1), 59–72. <https://e-journal.my.id/pedagogy/article/view/2382>



- Dharmadi, M. A., Widiartini, N. K., & Parwata, I. G. L. A. (2021). An Analysis of Junior Weight Vest Development to Improve Physical Abilities of Junior Athletes. *International Journal of Human Movement and Sports Sciences*, 9(3), 466–472. <https://doi.org/10.13189/saj.2021.090311>
- Donna, R., Egok, A. S., & Febriandi, R. (2021). Pengembangan Multimedia Interaktif Berbasis Powtoon pada Pembelajaran Tematik di Sekolah Dasar. *Jurnal Basicedu*, 5(5), 3799–3813. <https://jbasic.org/index.php/basicedu/article/view/1382>
- Gunawan, Dlis, F., & Widiastuti. (2019). Effect of Interactive Multimedia Learning To Learn Skills of Students Sports Volleyball. *Journal of Education, Health and Sport*, 9(9), 263–270. <https://apcz.umk.pl/JEHS/article/view/7407>
- Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, 3(May), 275–285. <https://doi.org/10.1016/j.susoc.2022.05.004>
- Hasri, S. A., Fitria, Y., Zen, Z., & Erita, Y. (2023). Keefektifan Penggunaan Multimedia Interaktif untuk Meningkatkan Hasil Belajar di Sekolah Dasar. *Innovative: Journal Of Social ...*, 3(2), 4593–4599. <https://doi.org/10.31004/innovative.v3i2.823>
- Hasrullah, H., Jabu, B., & Muhayyang, M. (2024). Using Smart Apps Creator (SAC) as an Android-Based Learning Multimedia in Improving the Students' Vocabulary Achievement. *EduLine: Journal of Education and Learning Innovation*, 4(2), 273–279. <https://doi.org/10.35877/454ri.eduline2619>
- Hermansyah, & Widyawati, E. (2024). Development of the Smartphone-Based Edutainment Game “ MathVenture ” as a Learning Medium Oriented Towards Creative Thinking Skills. *JDIME: Journal of Development and Innovation In Mathematics Education*, 2(2), 101–114. <https://ejournal.iainkerinci.ac.id/index.php/jdime/article/view/4293>
- Ilman Abi, M., & Sujatmiko, B. (2022). Pengembangan Media Pembelajaran Interaktif Menggunakan Smart App Creator Dalam Meningkatkan Hasil Belajar Siswa Pada Mata Pelajaran Multimedia Di Smk N 1 Jabon. *Jurnal IT-EDI*, 7, 84–91. <https://ejournal.unesa.ac.id/index.php/it-edu/article/view/50070>
- Muchtar, D., & Suryani, A. (2019). Pendidikan Karakter Menurut Kemendikbud (Telaah Pemikiran atas Kemendikbud). *Edumaspul: Jurnal Pendidikan*, 3(2), 50–57. <https://doi.org/10.33487/edumaspul.v3i2.142>
- Mustika, D. L. O., Soleh, D. A., & Supriatna, A. R. (2023). Pengembangan Multimedia Interaktif Berbasis Android Materi Operasi Bilangan Bulat pada Kelas Tinggi di Sekolah Dasar. *Jurnal Pendidikan Tambusai*. <https://jptam.org/index.php/jptam/article/view/5265>
- Muzakkir, M. A., Pomalato, S. W. D., & Katili, M. R. (2022). Efektivitas Multimedia Interaktif Berbasis Smartphone untuk Pembelajaran Matematika dengan Tatap Muka Terbatas. *JAMBURA JOURNAL OF MATHEMATICS EDUCATION*, 3(2), 81–92. <https://doi.org/10.34312/jmathedu.v3i2.15605>
- Oekta, Y., Umar, U., Komaini, A., Firdaus, K., Padli, P., & Masrun, M. (2024). Walk, run, jump and learn: Interactive multimedia for teaching locomotor skills in primary schools. *Research and Development in Education (RaDEn)*, 4(1), 1–11. <https://doi.org/10.22219/raden.v4i1.31831>
- Samsuddin, S., Indra, K., & Herli, P. (2022). the Effectiveness of E-Learning-Based Volleyball Service Video Media on Students Affected By Covid-19 At Faculty of Sports Science, Universitas Negeri Medan. *Physical Education Theory and Methodology*, 22(1), 7–13. <https://doi.org/10.17309/TMFV.2022.1.01>
- Saputro, P. A., & Miftahuddin, M. (2024). Development Of Smart App Creator 3 (SAC) Learning Media In Learning History To Increase Students' Interest In Learning At Senior High School 3 Magelang. *International Education Trend Issues*. <https://ijble.com/index.php/ieti/article/view/555>
- Satyawan, I. M., Lasmawan, I. W., Artanayasa, I. W., Swadesi, I. K. I., & Yoda, I. K. (2023). The development of interactive multimedia in e-learning Undiksha to improve soccer



- learning outcomes in FOK Undiksha. *Journal of Physical Education and Sport*, 23(12), 3468–3477. <https://doi.org/10.7752/jpes.2023.12398>
- Septiari, I. G. A. W., Wahyuni, D. S., & Putrama, I. M. (2020). Efektivitas Media E-Learning Dengan Model Blended Learning Pada Mata Pelajaran Administrasi Sistem. *Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika (KARMAPATI)*, 17(2), 275–285. <https://efsupit.ro/images/stories/december2023/Art398.pdf>
- Sugiyono. (2017). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif dan R&D)*. Bandung: Alfabeta, CV. <https://scholar.google.com/citations?user=MG0s5rkAAAAJ&hl=id>
- Sutrisni, D. M., Utaminingsih, S., Murtono, M., Mariam, I. O., & Pratama, H. (2022). The effectiveness of android-based budiran game assisted by smart apps creator 3 to improve science learning outcomes of fourth graders in theme 1. *Advances in Mobile Learning Educational Research*, 2(2), 483–492. <https://doi.org/10.25082/amler.2022.02.017>
- Szymanek-Pilarczyk, M. (2024). Adaptive changes in young football players working in a modified tactical periodization model based on the example of endurance. *Baltic Journal of Health and Physical Activity*, 16(1). <https://doi.org/10.29359/BJHPA.16.1.02>
- Vaughan, T. (2011). *Multimedia: Making It Work* (Eighth Edi). McGraw Hill Professional. https://doi.org/10.5822/978-1-61091-904-3_15
- Wahyuni, A., Supratman, S., & Lestari, P. (2023). Smart Apps Creator (SAC) Assisted Comic Media Development in Optimizing Visual Spatial Intelligence. *AlphaMath : Journal of Mathematics Education*, 9(1), 1. <https://doi.org/10.30595/alphamath.v9i1.15314>
- Watin, W., Wayan Gunada, I., Fauzia, H., & Ayub, S. (2023). The Effectiveness of Android-Based Physics Learning Media Assisted by Smart Apps Creator to Improve Learning Outcomes. *Jurnal Penelitian Dan Pembelajaran Fisika Indonesia*, 5(1). <https://doi.org/10.29303/jppfi.v5i1.208>

