

TPACK Flipbook Media for Football Passing Learning Outcomes in Grade VIII Students

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Abstract

Low learning outcomes in soccer passing techniques are often attributed to the dominance of conventional teaching methods and the lack of interactive digital resources. This study addresses the urgent need for innovative media by implementing TPACK-based digital flipbooks to improve students' cognitive and motor performance. This Classroom Action Research (CAR) follows the Kemmis and McTaggart model, which involves two cycles of planning, action, observation, and reflection. The subjects were 32 students of class VIII-A at SMP Negeri 4 Sukasada. Data were collected through observation and learning achievement tests, then analyzed using quantitative and qualitative descriptive techniques. The results showed a significant improvement in learning outcomes: the average score increased from 68 in Cycle I to 84 in Cycle II, while learning mastery increased from 21.9% to 100%. The most substantial progress was observed in the three domains of cognitive, affective, and psychomotor aspects. In conclusion, the integration of technology, pedagogy, and content knowledge through digital flipbooks effectively creates meaningful learning experiences. This approach is recommended as a strategic innovation to modernize physical education pedagogy.

Keywords: tpack; digital flipbook; football passing; learning outcomes; classroom action research

1. Introduction

Education plays a strategic role in improving the quality of human resources through comprehensive development of the cognitive, affective, and psychomotor domains (Adi Saputra et al., 2023). This requires adapting learning methods from conventional to the use of technology-based media to suit the characteristics of students in the digital age (Adi Saputra et al., 2023). The implementation of innovative TPACK-based learning models has been proven to significantly increase student engagement and learning outcomes through more contextual instructional experiences (Zahroh et al., 2025). Increased digital competence and acceptance of new technologies have been shown to be significant determinants in improving students' academic achievement in the field of exercise science (Rodafinos et al., 2024). Appropriate technology integration through the TPACK framework has been shown to bridge the gap between students' tactical understanding and technical execution in soccer games (Mulyana et al., 2025). The implementation of innovative physical education programs has been shown to significantly improve student learning outcomes across various developmental domains (Kliziene et al., 2021).

The modernization of physical education now demands a structured technopedagogical approach, where the integration of technology is no longer an option but a necessity to enhance the quality of movement-based learning and teacher competence (Wang, Samsudin, & Hidayat, 2026). One subject that directly contributes to this goal is Physical Education, Sports, and Health (PESH). Through physical education, students are expected to not only improve physical fitness but also develop discipline, cooperation, responsibility, and movement competence. In this context, soccer

is one of the most relevant learning materials because it encourages active participation and teamwork Satyawan et al., 2023)

However, football learning in schools still faces several challenges (Fikri et al., 2023) One of the basic techniques that must be mastered by students is passing, because passing is essential for maintaining ball possession, organizing attacks, and building effective team play (Satyawan et al., 2023). In practice, many students still experience difficulties in performing correct passing movements, particularly in terms of accuracy, coordination, and foot positioning (Fikri et al., 2023).

These conditions are often related to the dominance of conventional teaching methods, in which learning mainly depends on verbal explanation and direct teacher demonstration. Although this approach has certain benefits, it is often less effective for today's students who are more familiar with digital technology, visual media, and interactive learning experiences. As a result, student engagement tends to be lower, and opportunities to review movement techniques independently remain limited.

To respond to these challenges, teachers need an instructional framework that can integrate pedagogy, subject content, and technology appropriately. Technological Pedagogical Content Knowledge (TPACK) is considered a relevant framework because it helps teachers design learning activities by combining effective teaching strategies, appropriate content delivery, and technology integration to improve learning outcomes (Agus Wijaya et al., 2023).

One form of technology that can support the TPACK framework is digital flipbook media, which presents text, images, animations, audio, and video in an interactive format (Made et al., 2023a) In physical education learning, especially football passing techniques, this media enables students to repeatedly observe correct movements, understand technical procedures more clearly, and learn independently anytime and anywhere (Naufal et al., 2023).

The uniqueness of this study lies in the use of digital flipbook media as an interactive tool for learning motor skills in soccer passing material. Previous research generally emphasized the use of digital media for cognitive achievement, while this study focuses on the integration of multimedia technology to improve learning outcomes in physical education (Satyawan et al., 2023). This is supported by the finding that the use of flipbook-based e-modules has a significant impact on passing technique skills (Dian et al., 2023a) Based on initial observations at SMP Negeri 4 Sukasada, student learning outcomes are still low because the learning process is still dominated by conventional methods and limited interactive media, a phenomenon that often hinders achieving learning completion standards (Fikri et al., 2023).

Therefore, this study aimed to analyze the implementation of TPACK-based digital flipbook media to improve the learning outcomes of football passing techniques among Grade VIII-A students at SMP Negeri 4 Sukasada.

2. Method

This study employed a Classroom Action Research (CAR) design aimed at improving the quality of the learning process and students' learning outcomes in football passing techniques through the implementation of TPACK-based digital flipbook media. The research followed the spiral model proposed by Kemmis and McTaggart, which consists of four main stages: planning, action,

observation, and reflection, conducted in repeated cycles until the expected improvement is achieved (Siregar, 2025).

This study used a non-probability sampling method with a purposive sampling technique to determine the research subjects. Subject selection was based on initial observations indicating that student learning outcomes in soccer passing techniques were still below the minimum mastery criteria. This implementation model aims to create continuous improvement in the learning process through a systematic and measurable innovation cycle (Siregar, 2025). The selected subjects were 32 students of class VIII-A of SMP Negeri 4 Sukasada. This study was conducted in two cycles, where each cycle was designed to address weaknesses identified in the previous cycle.

This study employed Classroom Action Research based on the Kemmis and McTaggart model, consisting of planning, action, observation, and reflection stages. The research was conducted in two cycles, with two meetings in each cycle, involving collaboration between the teacher and the researcher.

At the planning stage, the researcher prepared TPACK-based lesson plans, digital flipbook media, observation sheets, and assessment instruments covering cognitive, affective, and psychomotor domains. The cognitive instrument consisted of 20 multiple-choice questions, while psychomotor and affective aspects were assessed using performance rubrics and attitude scales.

The action stage was carried out through student-centered learning by integrating digital flipbook media containing text, images, and instructional videos on football passing techniques. Learning activities included demonstrations, group discussions, and field practice to improve students' understanding and skills. During the observation stage, data on student participation and learning outcomes were collected through observation sheets, written tests, skill performance tests, and attitude assessments.

The reflection stage was conducted at the end of each cycle to evaluate the strengths and weaknesses of the implemented actions. The data were analyzed descriptively using mean scores and mastery learning percentages, which were used to improve the next cycle.

Data analysis in this study was conducted using descriptive quantitative and qualitative approaches. Quantitative data from students' learning outcomes were analyzed by calculating the mean scores and the percentage of students achieving mastery learning. Meanwhile, qualitative data from observations were analyzed through data reduction, data display, and conclusion drawing to describe changes in student behavior and engagement the learning process.

3. Result

The analysis of students' learning outcomes was conducted to determine the effectiveness of the implementation of TPACK-based digital flipbook media in improving football passing skills. The results were measured across three domains: cognitive, affective, and psychomotor.

In Cycle I, the average student learning outcome was still relatively low, indicating that students were in the adaptation phase toward the new learning approach. Although some improvement was observed, several students had not yet achieved the minimum mastery criteria. In contrast, Cycle II showed a significant improvement in all assessed aspects. Students demonstrated better understanding, improved technical skills, and more active participation during the learning process.

This improvement indicates that the refinement of instructional strategies in Cycle II successfully addressed the limitations found in Cycle I.

Table 1. Students' learning outcomes in cycle I and cycle II

Assessment aspect	Cycle I (mean score)	Cycle II (mean score)	Improvement
Cognitive	69,50	85,20	+15,70
Affective	69,10	84,00	+14,90
Psychomotor	65,40	82,80	+17,40
Overall Average	68,00	84,00	+16,00

The table shows that the most significant improvement occurred in the psychomotor domain, which is highly relevant to football passing skills. This suggests that the use of visual and interactive media effectively enhanced students' technical abilities.

Learning mastery was determined based on the percentage of students who achieved the minimum mastery criterion (KKM), which was set at 75. The results indicate a considerable increase in mastery from Cycle I to Cycle II.

In Cycle I, only a portion of students achieved mastery, reflecting that the learning process had not yet been fully effective. However, after improvements were made in Cycle II, the number of students achieving mastery increased significantly. This finding aligns with previous classroom action research studies, which show that iterative improvements in teaching strategies can enhance student learning outcomes and mastery levels.

Table 2. Students' learning mastery in cycle I and cycle II

Description	Cycle I	Cycle II
Number of Students	32	32
Students Achieving Mastery	7	32
Students Not Yet Mastery	25	0
Mastery Percentage (%)	21,9%	100%

The data indicate that the mastery percentage increased by 78,1%, demonstrating that the intervention was effective in improving students' performance.

A comparison between Cycle I and Cycle II clearly shows a consistent improvement in students' learning outcomes. The increase occurred not only in average scores but also in learning mastery and student engagement.

In Cycle I, learning outcomes were not optimal due to students' unfamiliarity with the TPACK-based learning approach and limited interaction with digital media. However, in Cycle II, improvements in instructional delivery, better classroom management, and more effective use of digital flipbook media resulted in higher student engagement and understanding.

Table 3. Comparison of learning outcomes between cycle I and cycle II

Indicator	Cycle I	Cycle II	Increase
Average Score	68.00	84.00	+16,00
Mastery Percentage	21,9%	100%	+78,1%

Indicator	Cycle I	Cycle II	Increase
Student Participation	Moderate	High	Improved
Learning Effectiveness	Fair	Very Good	Improved

The comparison confirms that the implementation of TPACK-based digital flipbook media significantly improved students' learning outcomes. The iterative process in Classroom Action Research allowed continuous refinement of teaching strategies, leading to optimal results in Cycle II. These findings are consistent with previous studies that highlight the effectiveness of technology-integrated learning in enhancing student performance in physical education.

4. Discussion

The high level of student engagement observed in this study mirrors the positive reception of digital media in other local middle schools, where students reported that visual-based tools made the learning process more enjoyable and less intimidating (Yasa et al., 2024). The findings of this study demonstrate that the implementation of TPACK-based digital flipbook media effectively improved students' learning outcomes in football passing techniques. The success of this intervention shifts the focus from the mere presence of technology to the meaningful integration of technological knowledge, pedagogical strategies, and content knowledge. According to (Schmidt, Mishra, Koehler et al., 2009) effective technology-based instruction occurs when teachers combine these three domains into a coherent learning design.

To understand the conceptual basis of this integration, the TPACK framework is visualized as the intersection of three primary knowledge domains (See Figure 1).

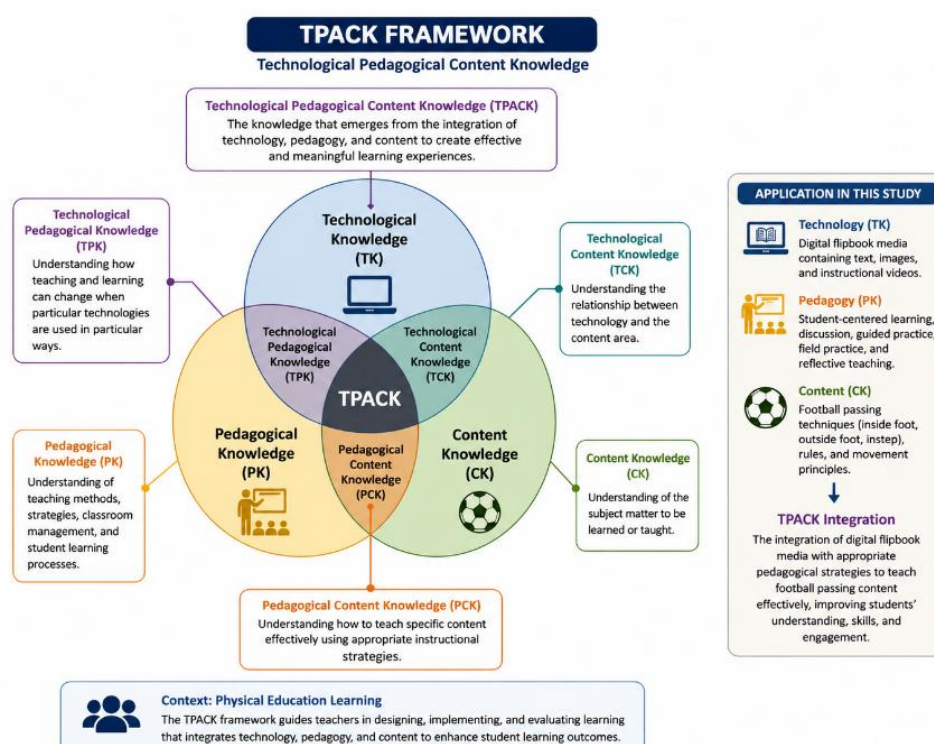


Figure 1. TPACK framework

In this study, Content Knowledge (CK) pertains to football passing mechanics, Pedagogical Knowledge (PK) involves student-centered strategies like guided practice, and Technology Knowledge (TK) refers to the digital flipbook. The synergy of these elements ensures that technology does not stand alone but serves as a bridge to deliver complex motor concepts more effectively.

The effectiveness of digital flipbook media in this study is derived from Mayer's (2009), Cognitive Theory of Multimedia Learning, which states that human cognitive processes will work more optimally when information is presented through a combination of words and images rather than text alone. Through the transmission of instructional videos and animation techniques, this media is able to mitigate the split-attention effect, where students can process visual and verbal information simultaneously through two different sensory channels. This finding is supported by previous research which shows that the use of flipbook-based e-modules is effective in creating an interactive learning environment and significantly improving learning outcomes (Rahman Marpaung, Ilham, & Eva Marlina, 2024) In line with the findings of (Fiqri, 2024), the use of media that can present concrete movement compression such as this is crucial in soccer material to transform abstract understanding into real motor mastery.

Physiologically, this repeated visual exposure supports the development of "motor programs" in the brain. From a motor learning perspective, observing correct movement patterns triggers mirror neurons, which facilitate the mental blueprinting of foot placement and body balance required for an accurate pass. This observational learning, as emphasized in Bandura's social learning theory, accelerates the transition from the cognitive stage to the associative stage of motor skill acquisition (Fiqri, 2024).

This study aligns with and extends the findings of (Dian et al., 2023), who also reported that flipbook-based e-modules significantly influence passing skills by providing a more flexible learning source. Furthermore, the success of this multimedia approach supports the work of (Satyawan et al., 2023) and (Agus Wijaya et al., 2023) who emphasized that ICT-oriented learning in the Undiksha environment effectively overcomes the limitations of conventional media in physical education.

However, this study offers a distinct contribution by focusing specifically on psychomotor outcomes in a secondary school context. While many previous studies—as noted by (Fikri et al., 2023)—often emphasize cognitive mastery, this research proves that digital media, when integrated through a TPACK framework, can directly enhance physical performance and technical execution in the field. These results are in line with recent findings showing that a TPACK-based learning approach has a significant positive impact on the development of technical skills as well as student motivation in football. (Mulyana et al., 2025)

To maintain scientific objectivity, several limitations must be acknowledged. First, the use of Non-Probability Purposive Sampling at SMP Negeri 4 Sukasada means the results are specific to this context and may not be generalized to all populations. Second, as a Classroom Action Research (CAR) study conducted in two cycles, the long-term retention of these skills beyond the intervention period remains unexamined. Third, external variables such as students' prior physical fitness and out-of-school football experience were not strictly controlled.

Future studies should explore the use of larger samples and longitudinal designs to track skill retention. Additionally, comparing flipbooks with more immersive technologies like Augmented

Reality (AR) could provide further insights into the evolution of TPACK in physical education. Overall, this study confirms that the "how" (Pedagogy) and "what" (Content) are just as critical as the "tool" (Technology) in achieving optimal learning outcomes.

5. Conclusion and Recommendation

Based on the results and discussion, it can be concluded that the implementation of TPACK-based digital flipbook media in physical education learning effectively improves students' learning outcomes in football passing techniques, as evident in the increase of average scores across cognitive, affective, and psychomotor domains, as well as the significant rise in learning mastery from Cycle I to Cycle II. This finding indicates that the integration of technology, pedagogy, and content knowledge creates a more meaningful and effective learning experience, where the most notable improvement was observed in the psychomotor domain, reflecting students' enhanced ability to perform football passing techniques correctly. The results of this study confirm that the use of digital technology within the TPACK framework is a strategy that greatly contributes to improving students' technical skills and engagement in sports learning (Xie, Chen, Li, & Huang, 2025). This improvement is strongly associated with the use of interactive and visual learning media, which allows students to better understand and practice movement skills, a finding consistent with previous studies confirming that TPACK-based learning approaches significantly contribute to improving students' technical skills and engagement (Mulyana et al., 2025; Xie et al., 2025; Kliziene et al., 2021). Furthermore, the Classroom Action Research (CAR) approach proved to be effective in improving the quality of the learning process through iterative cycles of planning, action, observation, and reflection, where the revisions made after Cycle I successfully addressed the identified weaknesses, leading to optimal results in Cycle II. In terms of advancing pedagogical knowledge, this study underscores the importance of practical reflection through CAR as a systematic way for educators to bridge the gap between theory and practice, ensuring that instructional strategies remain adaptive and evidence-based. For future application, it is highly recommended that physical education practitioners and teachers integrate TPACK-based multimedia such as digital flipbooks into their curriculum to facilitate complex motor learning. The success of this integration depends heavily on the teacher's ability to design instructional designs that balance ease of use of technology and pedagogical effectiveness (Park, Lee, & Sung, 2025). While maintaining a consistent reflective practice to continuously refine their teaching methods in response to the dynamic needs of students in the digital era.

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