

Student Experiences in Developing Physical Literacy through Technology-Supported Physical Education Practices

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ABSTRACT

The development of digital technology in Physical Education requires learning practices that can strengthen students' physical literacy contextually. This study aims to analyze students' experiences in developing motivation, confidence, movement competence, understanding of physical activity, and involvement in physical activity through technology-supported Physical Education practices. This study used a qualitative exploratory case study supported by descriptive quantitative data. Data were collected through questionnaires, observations, reflection journals, semi-structured interviews, and digital documentation involving 60 students, with 10 students selected as the main informants. Qualitative data were analyzed using thematic analysis, while questionnaire data were analyzed descriptively. The results show that technology helps students understand movement, monitor progress, increase motivation, build confidence, and support physical activity engagement. This study emphasizes that technology can function as a pedagogical support in Physical Education when it is used to strengthen physical practice, reflection, and student engagement.

INTRODUCTION

Sports education or Physical Education has an important role in forming students who are healthy, active, and able to understand the value of physical activity in daily life. In the global context, the urgency of Physical Education is getting stronger because low physical activity is still a health and education problem. The World Health Organization (2024) reports that around 80% of adolescents have not met daily physical activity recommendations. This condition shows that Physical Education is not enough to be directed only at the mastery of sports skills, but also needs to build physical literacy as the basis for students' active involvement in physical activities throughout life.

In the Indonesian context, the problem of student physical activity is also seen in various recent research results. Indriani and Tayyibah (2023) found that some junior high school students showed inadequate levels of physical activity and were still influenced by social support, age, and environmental conditions. Syafriani, Jajat, and Sultoni (2025) also showed that obstacles to adolescent physical activity are related to limited sports facilities, academic pressure, and low social support. These findings show that the development of physical literacy needs to be placed as a relevant educational issue, not just as part of physical fitness.

Theoretically, physical literacy includes motivation, confidence, movement competence, knowledge, and understanding that encourage individuals to engage in physical activity on an ongoing basis. Adi, Soenyoto, Yuwono, and Nurharsono (2025) emphasized that physical literacy, physical activity, and motivation have a positive relationship with Physical Education learning outcomes. Jerebine et al. (2024) also showed that physical literacy-based school interventions can improve children's physical aspects, although affective, cognitive, and social aspects still require stronger attention. Thus, physical literacy needs to be understood as a holistic concept that involves students' bodies, minds, attitudes, and learning experiences.

The development of digital technology provides new opportunities for Physical Education learning. Technology can be used in the form of learning videos, physical activity applications, web-based media, e-modules, digital reflection journals, and documentation of movement practices. Watikasari, Iyakrus, and Destriani (2023) show that web-based Physical Education learning media is feasible and effective in improving student learning outcomes. Sumarno, Ndayisenga, and Nohantiya (2024) also developed a challenge-based smartphone application to promote students' physical activity. These results show that technology can expand the learning space of Physical Education from just hands-on practice to more monitored, reflective, and personalized learning.

However, the use of technology in Physical Education does not necessarily automatically improve the quality of the student experience. Widodo et al. (2022) found that online learning for Physical Education still faces obstacles and requires e-modules that support independent learning. Komarudin (2021) also shows that the implementation of online Physical Education learning requires the readiness of students, teachers, devices, and the right learning strategies. The findings show that the effectiveness of technology is not only determined by the

existence of digital media, but also by the way technology is used to support student interaction, feedback, motion comprehension, and engagement.

The research gap is still seen in the limited studies that examine students' experiences in depth in developing physical literacy through technology-based Physical Education practices. Ridha, Mashud, Warni, and Arifin (2025) stated that physical literacy research in Indonesia still tends to be fragmented, oriented towards movement skills, and has not integrated much of the dimensions of motivation, confidence, knowledge, and long-term involvement. Watson-Mackie et al. (2024) also emphasized that technology has the potential to support physical activity and physical literacy, but studies that look at user experience contextually are still needed. Thus, this research is directed to fill the gap between the study of Physical Education learning technology and the development of physical literacy based on student experience.

Based on this background, this study aims to analyze students' experiences in developing physical literacy through technology-supported Physical Education practices. The focus of the research is directed at how students interpret the use of technology in increasing motivation, confidence, movement competence, knowledge, and physical activity involvement. This research also aims to identify the forms of technological support that are felt to help students, as well as the obstacles that arise during the learning process. With this focus, this study not only looks at learning outcomes, but also the process of students' experiences in building awareness and habits of being physically active.

This research is expected to make a theoretical and practical contribution. Theoretically, this study enriches the study of physical literacy by placing students' experiences as the basis for analysis in the context of technology-based Physical Education. Practically, the results of the research can be an input for Physical Education teachers in designing learning that is more interactive, reflective, and in accordance with the needs of students. In addition, this research can help schools in developing technology integration strategies that are not only oriented to learning media, but also to the formation of motivation, confidence, movement competence, and involvement of students' physical activities in a sustainable manner.

LITERATURE REVIEW

Physical Literacy in Physical Education

Physical literacy is an important concept in Physical Education because it not only emphasizes movement skills, but also includes motivation, confidence, knowledge, understanding, and student involvement in physical activity. In the context of sports learning, physical literacy helps students understand the benefits of movement for health and daily life. Ridha, Mashud, Warni, and Arifin (2025) explained that the study of physical literacy in Indonesia is still developing and needs to be directed to a more comprehensive approach. This is in line with Jerebine et al. (2024) who emphasized that physical literacy needs to be developed through learning experiences that include physical, affective, cognitive, and social aspects.

Student Experience in Physical Education Learning

Student experience is an important aspect in seeing the success of Physical Education learning. Students are not only judged by their ability to make movements, but also by how they feel, understand, and interpret the learning process. Sipayung, Rifki, Bahtra, and Fauziah (2024) found that learning motivation is related to students' Physical Education learning outcomes. This means that a positive learning experience can strengthen students' participation and confidence in physical activities. Therefore, research on student experiences is important to understand how physical literacy develops in the learning process.

Technology as a Support for Physical Education

Technology can support Physical Education through learning videos, web-based media, physical activity apps, e-modules, and digital documentation. Waticasari, Iyakrus, and Destriani (2023) show that web-based Physical Education learning media is effective in improving student learning outcomes. Sumarno, Ndayisenga, and Nohantiya (2024) also explained that challenge-based smartphone applications can encourage students' physical activity. In the context of physical literacy, technology helps students understand movement techniques, monitor their personal development, and gain a more independent learning experience.

The Challenges of Technology Integration in Physical Education Learning

Although technology has many benefits, its use in Physical Education still faces challenges. Komarudin (2021) explained that online-based Physical Education learning requires the readiness of students, teachers, devices, and appropriate learning strategies. Widodo et al. (2022) also emphasized the need for e-modules that can support independent learning in Physical Education. The challenge shows that technology should not only be used as a medium for delivering material, but should be designed to strengthen students' movement, interaction, feedback, and reflection practices.

Research Gap and Study Position

Previous studies have extensively discussed the use of technology in Physical Education, but most have still focused on the effectiveness of media, learning outcomes, or app development. Research that specifically examines students' experiences in developing physical literacy through technology-based Physical Education practices is still limited. Watson-Mackie et al. (2024) state that technology has the potential to support physical activity and physical literacy, but the user experience still needs to be studied more deeply. Therefore, this study focuses on students' experiences in developing motivation, confidence, movement competence, knowledge, and physical activity engagement through technology-supported Physical Education practices.

METHODOLOGY

Research Design

This study used a qualitative exploratory case study design supported by descriptive quantitative data. This design was selected because the research focused on students' experiences in developing physical literacy through technology-supported Physical Education practices. The study did not aim to test hypotheses or causal relationships between variables, but to understand students' experiences, responses, perceived benefits, and barriers during technology-supported Physical Education learning. The qualitative approach was used as the main design, while descriptive quantitative data were used to strengthen the description of students' physical literacy tendencies.

Population and Sample

The population of this study was high school students who participated in technology-supported Physical Education learning. The sample consisted of 60 students selected using purposive sampling. This sampling technique was used because the participants had direct experience using learning videos, physical activity applications, digital reflection journals, web-based media, and movement documentation during Physical Education lessons. From the 60 students, 10 students were selected as the main informants for semi-structured interviews. The informants were chosen based on variations in participation, learning engagement, and ability to reflect on their learning experiences.

Research Instruments

The research instruments consisted of a physical literacy questionnaire, semi-structured interview guidelines, observation sheets, student reflection journals, and digital documentation. The questionnaire used a Likert scale of 1–5 to measure motivation, confidence, movement competence, understanding of physical activity, and physical activity involvement. The interview guidelines were used to explore students' experiences in more detail. Observation sheets were used to record student engagement during learning activities, while reflection journals were used to identify students' personal learning experiences after participating in technology-supported Physical Education. Digital documentation was used to record learning videos, application use, movement practice, and students' physical activity tasks. The content validity of the instruments was assessed by Physical Education and learning evaluation experts. The reliability of the questionnaire was tested using Cronbach's Alpha, with a minimum acceptable value of 0.70.

Data Collection Procedure

Data collection was conducted in several stages. The first stage was a preliminary study to identify the use of technology in Physical Education learning. The second stage was the preparation, validation, and limited trial of the research instruments. The third stage was the implementation of technology-supported Physical Education learning using learning videos, physical activity applications, digital reflection journals, web-based media, and movement

documentation. The fourth stage was the collection of data through questionnaires, classroom observations, student reflection journals, semi-structured interviews, and digital documentation. The final stage was checking the completeness of the data before conducting quantitative and qualitative analysis.

Data Analysis Technique

Quantitative data from the questionnaire were analyzed descriptively using frequency, percentage, mean, and standard deviation with the help of SPSS. The questionnaire score used a Likert scale of 1–5, with the following interpretation categories: 1.00–1.80 very low, 1.81–2.60 low, 2.61–3.40 moderate, 3.41–4.20 good, and 4.21–5.00 very good. Qualitative data obtained from interviews, observations, reflection journals, and digital documentation were analyzed using thematic analysis. The analysis process included data transcription, repeated reading, coding, categorization, theme development, interpretation, and conclusion drawing. NVivo was used to assist the process of coding, categorizing, and developing qualitative themes.

RESEARCH RESULT

Overview of Research Data

This study involved 60 high school students who participated in technology-based Physical Education learning. Data were obtained through questionnaires, learning observations, student reflection journals, in-depth interviews with the 10 main informants, and digital documentation of learning activities. The analysis was carried out to find out students' experiences in the use of technology and its contribution to the development of physical literacy. Quantitative data is used to describe students' physical literacy tendencies, while qualitative data is used to clarify students' experiences during the learning process.

Table 1. Characteristics of Research Participants

Feature	Category	Number of Students	Percentage
Number of participants	High school students	60	100%
Gender	Male	32	53.3%
Gender	Female	28	46.7%
Interview informants	Selected students	10	16.7%

The questionnaire score uses a Likert scale of 1 to 5. The interpretation categories of scores are determined as follows: 1.00 to 1.80 including very low, 1.81 to 2.60 including low, 2.61 to 3.40 including moderate, 3.41 to 4.20 including good, and 4.21 to 5.00 including very good. This category is used to explain students' physical literacy tendencies in terms of motivation, confidence, understanding of physical activity, and involvement in physical activity.

Students' Experience in Understanding Movement through Technology

The results of the study show that technology helps students understand movement more clearly. The learning video provides visual examples that can be played back before students practice. Students find it easier to understand body positions, movement sequences, and technique errors when the material is presented through videos or motion documentation. These findings appear consistently in interviews, reflection journals, and learning observations.

One of the informants stated, "*I understand the movements better if I see the video first. If it is just explained, sometimes I am still confused about what the position of my hands and feet should be like*" (S1/W1/12-03-2025). Another informant explained, "*The video allowed me to repeat the example of the movement several times before practice, so I didn't hesitate too much when I tried*" (S4/W1/12-03-2025). The quote shows that technology plays a role as a visual medium that helps students understand movement instructions in a more concrete way.

Table 2. Students' Perception of the Role of Technology in Motion Understanding

Aspects Assessed	Key Findings	Students' Dominant Response
Understanding of motion techniques	Videos help understand the stages of movement	Positive
Motion error correction	Recording helps see movement deficiencies	Positive
Ease of independent learning	Material can be re-studied	Positive

Results of Student Physical Literacy Component Questionnaire

The questionnaire results show that all components of physical literacy were in the good to very good category. The motivation component obtained the highest mean score, namely 4.35 with a standard deviation of 0.48. This result indicates that students had a strong motivation to participate in physical activity when learning was supported by technology. The component of understanding physical activity was also in the very good category, with a mean score of 4.22 and a standard deviation of 0.50. Meanwhile, confidence, movement competence, and physical activity involvement were in the good category.

Table 3. Results of Student Physical Literacy Component Questionnaire

Physical Literacy Component	Mean	SD	Interpretation
Motivation to participate in physical activity	4.35	0.48	Very Good
Confidence in making movements	4.18	0.52	Good
Understanding of physical activity	4.22	0.50	Very Good
Involvement in physical activity	4.10	0.55	Good
Movement competence	4.08	0.57	Good
Overall average	4.19	0.52	Good

Based on these results, motivation and understanding of physical activity were the most prominent components of students' physical literacy. This finding indicates that technology was more strongly perceived as helping students increase learning interest, understand movement materials, and follow Physical Education activities in a more directed way. Movement competence and physical activity involvement had lower mean scores than motivation and understanding, although both remained in the good category. This result shows that technology supports students' learning experiences, but direct practice, teacher guidance, and continuous feedback are still needed to strengthen movement competence and active participation.

Increased Student Motivation and Participation

The results of the questionnaire showed that the motivation aspect obtained the highest average score compared to other aspects of physical literacy. Students stated that Physical Education learning feels more engaging when teachers use videos, physical activity apps, and digital challenges. Observations also show that students are more active in following instructions when learning activities are associated with the use of technology.

This can be seen from the informant's statement, *"I feel that sports lessons are more interesting because there are applications and movement tasks that can be recorded. It feels like having your own target"* (S2/W1/13-03-2025). Another informant said, *"Usually I don't have enthusiasm for sports, but when I use the application I want to complete activity targets"* (S7/W1/13-03-2025). These findings suggest that technology can increase student motivation through more focused, measurable, and challenging activities.

Confidence in Physical Activity

Interview data shows that technology helps students build confidence. Students feel more prepared to perform movements after seeing visual examples and understanding the stages of practice. Motion documentation also helps students evaluate their abilities without always relying on direct assessment from the teacher. Confidence increases because students can see their progress over time.

One informant stated, *"I was initially afraid of making the wrong move, but after seeing examples and trying several times, I became more confident"* (S3/W1/14-03-2025). Another informant said, *"When I look at my own movement footage, I know which parts need to be fixed. After that, I am more confident to try again"* (S6/W1/14-03-2025). This quote shows that technology helps students recognize their abilities and reduce doubt in movement practice.

Monitoring Progress and Learning Reflection

The results of the digital reflection journal show that students are starting to be able to monitor their learning progress. They recorded the movements that had been mastered, the parts that were still difficult, and the improvement targets at the next meeting. The physical activity app also helps students see the duration of exercise, the number of activities, and the regularity of participation. Thus, technology functions as a tool for reflection and self-monitoring.

This is reinforced by the informant's quote, "I can see if my activity is enough or not. From the application records, I know that I am still not active" (S5/W1/15-03-2025). Another informant stated, "The reflection journal made me aware of which movements I had not mastered. So the next week I have a target to improve" (S8/W1/15-03-2025). These findings show that technology not only helps the practice process, but also helps students understand their own development more consciously.

Table 4. Main Themes of Student Interview Results

Theme	Description of Findings	Examples of Student Experience
Understanding motion	Technology helps visualization of techniques	Review motion videos
Motivation	Digital activities make learning interesting	Completing application targets
Confidence	Students are more confident in trying out moves	Evaluation via video recording
Learning reflection	Students know their own development	Using a digital journal

Barriers to Technology Use

While technology provides many benefits, the results of the study also found some obstacles. The most common obstacles that arise are unstable internet networks, device limitations, difficulty using applications, and reduced practice time because students need to adjust to the use of technology. Some students also stated that the use of gadgets can interfere with focus if not clearly directed by the teacher.

One of the informants said, "Sometimes videos are difficult to open because the network is slow, so I have to wait before I can see the movement examples" (S9/W1/16-03-2025). Another informant explained, "The app helped, but at first I was confused about how to use it. Teachers must explain first so that we don't fill in the data incorrectly" (S10/W1/16-03-2025). These findings show that the integration of technology in Physical Education still requires device readiness, connections, clear instructions, and teacher mentoring.

Table 5. Barriers to the Use of Technology in Physical Education Learning

Barriers	Impact on Learning	Solutions Needed
Unstable internet connection	Hinder video and app access	Provision of offline materials
Device limitations	Not all students can access technology	Shared device use
Difficulty using the app	Reducing learning effectiveness	Teacher guidance and mentoring
Potential focus disorders	Students use gadgets outside of learning purposes	Supervision and rules of use

Quantitative and Qualitative Data Integration

Data integration was carried out to see the suitability between the results of the questionnaire and the qualitative findings. The results of the questionnaire showed that motivation and understanding of physical activity obtained the highest scores. These findings are in line with the results of interviews and reflection journals that show that students feel more interested in participating in learning because of videos, physical activity apps, and digital targets. The qualitative data also makes it clear that technology helps students understand the stages of motion and evaluate errors through video recording.

Table 6. Integration of Questionnaire Results and Qualitative Findings

Aspects	Questionnaire Results	Interview Results and Reflections	Conclusion of Findings
Motivation	Mean 4.35, SD 0.48, very good	Students feel more interested because there are target applications and digital activities	Technology strengthens learning motivation
Confidence	Mean 4.18, SD 0.52, good	Students are more confident in trying movements after seeing video examples	Technology helps practice readiness
Understanding physical activity	Mean 4.22, SD 0.50, very good	Videos help students understand the stages and techniques of movement	Technology clarifies movement instructions
Physical activity involvement	Mean 4.10, SD 0.55, good	Students are more active in participating in practical tasks and digital reflection	Technology supports student participation
Movement competence	Mean 4.08, SD 0.57, good	Students can improve movement after reviewing practice recordings	Technology supports movement improvement

The results of the integration show that quantitative and qualitative data corroborate each other. The questionnaire showed a positive tendency in all components of physical literacy, while interviews, observations, reflection journals, and digital documentation explained the form of the student's experience in more detail. Thus, the results of the study show that technology plays a role as a learning support that helps students understand movement, increase motivation, build confidence, and monitor the development of physical activity.

Summary of Key Findings

In general, the results of the study show that technology-based Physical Education practices support the development of students' physical literacy. Key findings show that technology helps students understand movement, increase motivation, build confidence, monitor progress, and increase physical activity engagement. However, the results of the study also show that technical obstacles still need to be considered so that technology does not reduce the quality of physical practice.

Based on the results of interviews, observations, reflection journals, questionnaires, and digital documentation, students' experiences show that technology plays the strongest role in the aspects of understanding movement, motivation, and learning reflection. Meanwhile, the aspect of movement competence still requires direct practice, teacher mentoring, and continuous evaluation. Thus, technology in Physical Education functions as a support for the learning process, not as a substitute for physical practice.

DISCUSSION

The results of the study show that technology-supported Physical Education practices contributed positively to the development of students' physical literacy, especially in the aspects of motivation, understanding of physical activity, confidence, movement competence, and involvement in physical activity. The questionnaire results indicate that students' overall physical literacy was in the good category, with motivation and understanding of physical activity reaching the very good category. Motivation obtained the highest mean score of 4.35, followed by understanding of physical activity with a score of 4.22, confidence with a score of 4.18, physical activity involvement with a score of 4.10, and movement competence with a score of 4.08. These findings indicate that technology functions not only as an additional learning medium, but also as a pedagogical tool that helps students understand movement, monitor progress, build confidence, and engage more actively in Physical Education learning (Ridha et al., 2025; Jerebine et al., 2024).

The first findings suggest that technology helps students understand movement in a more concrete way. Learning videos, motion documentation, and digital media give students the opportunity to see movement examples, repeat material, and recognize technical errors. This reinforces the understanding that Physical Education requires not only verbal instruction, but also visual support that can help students understand sequence, body position, and coordination of movement. These findings are in line with Waticasari et al. (2023) who show that web-based Physical Education learning media can increase learning effectiveness because the material is easier to access and relearn. Rodrigues and Lima (2024) also emphasized that digital technology in Physical Education can expand the learning experience if used to support students' movement, reflection, and comprehension activities. Thus, the use of technology in this study strengthens students' cognitive processes in understanding physical activity.

The second finding shows that technology increases student motivation and participation. Motivation scores in the excellent category indicate that students feel more interested in learning when physical activity is associated with videos, apps, and digital targets. Physical activity apps provide a more measurable learning experience because students can see the target, duration, and progress of their activities. These results are in line with Adi et al. (2025) who explained that physical literacy, physical activity, and motivation are related to Physical Education learning outcomes. Sumarno et al. (2024) also show that challenge-based smartphone applications can be used to encourage students' physical activity. The significance of these findings is that students' motivation can be strengthened if technology not only presents material, but also provides challenges, feedback, and space for students to see their progress.

The third finding shows that technology helps build students' confidence in physical activity. Interviews show that students feel more prepared to perform movements after seeing video examples and evaluating their own motion recordings. This suggests that technology can reduce students' doubts because they have a clearer picture before practice. In the framework of physical literacy, confidence is an important element because students who feel capable tend to be more courageous to try, correct mistakes, and engage in physical activities. Jerebine et al. (2024) emphasized that physical literacy interventions need to pay attention to affective aspects, not just physical skills. Therefore, the findings of this study show that technology can support the affective aspects of physical literacy through a safer, gradual, and reflective learning experience.

The fourth finding suggests that technology supports progress monitoring and reflection learning. Digital reflection journals and physical activity apps help students recognize movements that have been mastered, the parts that are still difficult, and the targets for improvement in the next meeting. This finding is important because physical literacy is not only related to the ability to perform movements, but also the ability to understand, evaluate, and make decisions related to physical activity. Watson-Mackie et al. (2024) explain that technology has the potential to support physical activity and physical literacy because it can help with self-monitoring and user engagement. In this study, digital reflection is an important part because students not only receive assessments from teachers, but also begin to assess their own development. Thus, technology helps build a more independent learning awareness.

However, the results of the study also show that technology has not fully guaranteed increased involvement in physical activity. The engagement component scored 4.10, lower than motivation and understanding. This difference suggests that students can feel motivated and understand movement, but not necessarily optimally engage in physical activity. Factors that affect this condition include limited practice time, device constraints, internet networks, students' technical abilities, and potential focus disturbances when using gadgets. These findings are in line with Widodo et al. (2022) who emphasized the need for e-modules that support independent learning in Physical Education, and Komarudin (2021) who showed that technology-based Physical Education learning requires the readiness of students, teachers, devices, and appropriate

learning strategies. This means that technology can strengthen learning if it is supported by a clear pedagogical design and does not reduce physical practice time.

When compared to previous research, the results of this study have similarities as well as differences. In common, this study supports the findings of Watikasari et al. (2023) and Sumarno et al. (2024) that technology can help Physical Education learning and encourage physical activity. However, this study is different because it not only assesses the effectiveness of media or applications, but emphasizes students' experience in developing physical literacy. This study also expands on the findings of Ridha et al. (2025) who stated that physical literacy studies in Indonesia still tend to focus on movement skills and have not integrated much of the dimensions of motivation, confidence, knowledge, and long-term engagement. By placing students' experiences at the center of the analysis, this research contributes to the understanding that physical literacy develops through personalized, reflective, and contextual learning processes.

The findings of this study also show that the main supporting factors for the success of technology integration are the clarity of instruction, the relationship of technology with movement activities, the ability of students to monitor progress, and teacher assistance. Technology becomes effective when used to clarify movements, target activities, and facilitate reflection. On the other hand, technology becomes less optimal if it is only used as a medium of conveying material or if its use is not directly connected to physical practice. These findings reinforce the idea that technology in Physical Education should be placed as a pedagogical tool, not a substitute for movement experience. In this context, teachers still have a leading role in directing activities, providing feedback, maintaining student focus, and ensuring learning remains oriented to physical activity.

Theoretically, this research contributes to the development of physical literacy studies by emphasizing the importance of student experience as part of the process of forming physical literacy. Physical literacy is not only understood as a result of movement skills or fitness levels, but also as a process that involves motivation, confidence, understanding, reflection, and active engagement. Practically, this study provides direction for Physical Education teachers to integrate technology selectively and functionally. Teachers can use videos to clarify techniques, apps to monitor activities, digital journals for reflection, and motion documentation for evaluation. This strategy can help Physical Education learning become more interactive, measurable, and in accordance with the needs of students.

The constraints of this research need to be examined critically. First, the research was only conducted in one school context so the results could not be generalized widely. Second, the quantitative data used is descriptive so it cannot explain the causal relationship between the use of technology and the improvement of physical literacy. Third, some of the data comes from student perceptions so that subjective biases are still possible. Fourth, the use of technology is still influenced by device access, internet quality, and students'

ability to use applications. This constraint is in line with Syafriani et al. (2025) who show that adolescents' physical activity barriers can be influenced by environmental factors, facilities, and social support.

Based on these limitations, further research is recommended to use a stronger mixed methods design, such as explanatory sequential design or quasi-experiment with pretest and posttest. The next study can also compare classes that use technology and classes that use conventional learning to see the difference in physical literacy development more objectively. In addition, follow-up research needs to use more widely validated physical literacy instruments, involve more schools, and measure the long-term impact of technology use on students' physical activities outside the classroom. From a practical perspective, schools need to prepare guidelines for the use of technology in Physical Education, provide offline materials, provide teacher training, and ensure that technology is used to strengthen movement practices, not reduce students' physical activity time.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that technology-supported Physical Education practices play a positive role in supporting students' physical literacy development. The use of learning videos, physical activity applications, digital reflection journals, and movement documentation helps students understand movement stages, monitor progress, increase motivation, build confidence, and support engagement in physical activity. The questionnaire results show that students' physical literacy components were generally in the good to very good category, with motivation and understanding of physical activity as the most prominent aspects. Qualitative findings also support these results, as students reported that they understood movements more easily, felt more confident to try, and were better able to reflect on their learning progress. Therefore, technology can be used as a relevant pedagogical support in Physical Education, as long as it strengthens physical practice rather than replacing it.

ADVANCED RESEARCH

Further research is recommended using more robust mixed methods design, such as explanatory sequential design or quasi-experiments with pretest and posttest, to measure the influence of technology on physical literacy more objectively. Future research could also involve more schools, comparing technology-based classrooms with conventional classrooms, as well as measure the long-term impact of technology use on students' physical activities outside of the school environment.

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