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Original Article Research

The Effect of Digital Literacy-Based Learning on Student Participation in Physical Education Classes in High School

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Abstract

This research examined whether implementing digital literacy-oriented learning could enhance student participation in Physical Education lessons at Al-Musaddadiyah High School, Garut. A quantitative The research used a quantitative methodology involving one participant group that completed pretest and posttest measurements to evaluate the effect of the intervention. The study population consisted of 11th-grade students at Al-Musaddadiyah High School in Garut, and the sampling technique used was purposive sampling. Participant engagement was assessed using a structured questionnaire that examined involvement in physical activities as well as mental, emotional, and social dimensions. Data analysis was performed using descriptive tests, data were analyzed with SPSS by first assessing distribution normality through the Shapiro–Wilk procedure and subsequently testing the research hypothesis conducting a Paired Sample T-Test analysis. The analysis showed that the integration of digital literacy into the learning process contributed to a positive change in students' participation levels. Statistical analysis demonstrated a significant increase in participation, the statistical test produced a significance value of 0.005, which was below the 0.05 threshold ($p < 0.05$). An increase in student participation was observed in the physical, mental, emotional, and social aspects, with the physical aspect showing the greatest improvement. Evidence from the research showed that the integration of digital literacy within physical education instruction encouraged greater student involvement throughout the learning process. The study contributes to the advancement of knowledge related to the use of technology in Physical Education while supporting future research focused on student involvement within a wider range of educational settings.

Keywords: Digital literacy; participation; physical education

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1. INTRODUCTION

Advances in digital technology have brought major changes to educational instruction, resulting in new teaching and learning approaches in Physical Education. Digital technology influences how students acquire information, interact, and learn in the school environment. According to (Sterlie et al., 2022) the education sector must adapt to digital technology advancements to develop 21st-century skills, one of which is digital literacy. Digital literacy refers to the competence required to obtain, analyze, assess, and apply digital information appropriately in various educational contexts (Sanchez-Caballe et al., 2021)

Physical Education is an educational subject that promotes physical development, movement skills, healthy behavior, and character formation through structured learning experiences, particularly through the acquisition of information from digital media. Therefore, digital literacy skills are essential, given the ever-increasing flow of information, particularly in the formal education sector. The advent of the information age and the rapid development of media will inevitably transform how people interact (Listiaji & Subhan, 2021)

In the context of Physical Education, digital literacy plays a crucial role because the nature of this subject emphasizes physical activity, an understanding of movement, and active student engagement (Taufik et al., 2024). (Saiz-Gonzalez et al., 2025) explains that digital literacy-based Physical Education learning enables students to utilize various media such as instructional videos, e-learning, and digital modules to enhance their understanding of the material and foster creative learning. Successful involvement in digitally supported instruction relies on students having the knowledge and skills needed to access, understand, and utilize digital resources effectively (Nwamu & Ni, 2023).

The success of Physical Education instruction is measured not only by cognitive learning outcomes but also by student participation. Student participation refers to active engagement physically, mentally, and emotionally during the learning process (Zhang et al., 2025). High participation indicates that students are motivated, enthusiastic, and fully engaged in learning activities. Conversely, low student participation will hinder the achievement of learning objectives, such as improved physical fitness, motor skills, and sportsmanship (Asnawati et al., 2023).

Student participation is one of the key indicators of the success of the learning process. Participation encompasses students' mental and emotional engagement, which encourages active contributions to learning activities(Martin & Borup, 2022) . In Physical Education, participation is not only evident in student attendance but also in physical engagement, readiness to participate in movement activities, cooperation with peers, and enthusiasm in following the teacher's instructions. Research confirms that students' active participation in learning directly influences the effectiveness of achieving learning objectives (Nkomo et al., 2021). In the practice of Physical Education instruction in schools, student participation remains a common challenge faced by teachers. Not all students demonstrate active engagement during lessons. Some students tend to be passive, lack enthusiasm for practical activities, and do not participate in discussions or group work. These conditions can affect the effectiveness of Physical Education learning because learning success is determined not only by mastery of the material but also by students' active involvement during the learning process. Therefore, Developing appropriate instructional methods is essential for stimulating students' interest, maintaining their focus, and encouraging active participation throughout Physical Education lessons.

One key issue is that, despite the growing integration of digital technology in learningespecially following the shift to online instruction it is still uncertain whether students' digital literacy influences their participation levels in Physical Education classes. For instance, Al-Musaddadiyah High School in Garut has already provided digital learning resources; on the other hand, although digital facilities and learning resources are available, not all students are able to make the most of them. (Rukmiati, 2022) states that differences in digital literacy skills can create a gap in the learning process, where students with low digital literacy tend to be less active and experience difficulties in participating in technology-based learning. This situation is also observed in Physical Education classes, where students face difficulties in understanding digital instructions or utilizing the learning materials provided. The inclusion of digital literacy as part of Physical Education instruction creates opportunities to improve learning quality and enrich students' educational experiences. The integration of digital media in teaching allows educators to deliver learning materials in a more interactive and comprehensible way for students. Within Physical Education, instructional videos and other forms of digital media assist students in gaining a clearer understanding of movement techniques, thereby facilitating their participation in practical activities. Moreover, integrating digital technology into learning can increase student motivation by making lessons more interactive and less repetitive.

The theory used in this study is the contemporary digital literacy theory developed by Nurjanah, Masithoh, and Zulfaida (Nurjanah et al., 2024). The development of Physical Education instruction, which is now increasingly integrated with technology. In modern Physical Education instruction, students frequently interact with various digital media such as movement demonstration videos, fitness apps, digital modules, activity tracking devices, and Learning Management Systems (LMS) (Nkomo et al., 2021). Technology-based Physical Education requires students to possess adequate digital literacy so they can effectively participate in learning activities. Therefore, contemporary digital literacy theory is highly relevant for explaining how students' digital skills influence their level of participation. Digital literacy encompasses several key components: photo-visual literacy, reproduction literacy, information literacy, branching literacy, and socio-emotional literacy (Getenet et al., 2024). These components indicate that students with high levels of digital literacy will be able to access information, understand digital instructions, evaluate learning resources, and utilize digital media as tools to support the learning process (Radovanović, 2023)This underscores that modern digital literacy emphasizes students' ability to use technology effectively and independently in learning. Thus, digital literacy is not merely a technical skill but also encompasses critical thinking, evaluating information, and building knowledge through various digital sources within a learning environment (Sawitri, 2025).

According to educational theories, the development of digital literacy skills may encourage greater student participation by enabling learning experiences that are interactive, motivating, and responsive to diverse learning needs. Access to technology-based learning resources, such as video instruction, online educational platforms, and interactive digital materials, can improve students' understanding of academic content while fostering higher levels of learning motivation (Jaya & Sucipto, 2023). When students feel interested and motivated, their engagement in learning physically, mentally, emotionally, and socially will increase (de Brito Lima et al., 2021). Thus, digital literacy-based learning can be a strategy to increase student participation in Physical Education.

Prior studies have predominantly focused on how digital literacy relates to academic performance, the integration of instructional media, and teachers' digital competence in classroom-based learning environments. In addition, recent evidence indicates that integrating digital technologies into learning activities can enhance students' motivation and contribute to better academic outcomes. For instance, (Husna et al., 2024) study demonstrates that Physical Education teachers' digital literacy influences the appeal of instruction, while (Wulandari & Aslam, 2022) reveals a positive relationship between digital literacy and academic results achieved by students.

Nevertheless, specifically examining the impact research of digital literacy-based learning on student participation in Physical Education classes remains relatively limited, particularly at the high school level. Furthermore, most previous studies have focused more on cognitive aspects rather than student engagement in physical, mental, emotional, and social aspects during the learning process (Zhao et al., 2021). Consequently, this research was undertaken to provide evidence-based insights into how the integration of digital literacy within instructional practices may influence students' participation during Physical Education learning activities.

A key contribution of the present research is its emphasis on assessing how the integration of digital literacy into instructional practices affects student participation in Physical Education among high school students. This study not only examines students' learning outcomes but also analyzes their engagement in physical, mental, emotional, and social aspects throughout the learning process. Consequently, this study is expected to strengthen the implementation of digital technology in Physical Education by fostering more interactive and participatory learning environments that align with ongoing developments in the digital era (Pürgstaller et al., 2025)

This research is conducted to evaluate how the application of digital literacy in instructional practices contributes to student engagement in Physical Education among high school learners. This research was designed to evaluate how the application of digital literacy in learning environments contributes to students' overall engagement, including physical, mental, emotional, and social participation throughout the educational process (Widowati et al., 2023).

2. METHOD

Using a quantitative approach, this study adopted a one-group pre-experimental design in which data were collected through pretest and posttest procedures (Hendrayadi et al., 2023). The main aim of this research was to assess the extent to which digital literacy-based instruction affects student participation in Physical Education classes. Through digital literacy, students are able to obtain, evaluate, and apply information from a variety of technology-based resources, which may support their involvement in learning activities, thereby enhancing their participation in the learning process specifically in terms of readiness, activity, interaction, and engagement in physical activities. A total of 36 students participated as research subjects in this study. Purposive sampling was applied to select a class that satisfied the study's criteria, which was then assigned as the experimental group for the research.

The research instrument was designed to obtain accurate data regarding the aspects under study. Data were collected using a specially designed questionnaire that examined students' participation through four distinct dimensions of engagement, namely (1) physical, (2) mental (3) emotional, and (4) social, comprising 17 indicators with a total of 58 sub-indicators, which were

then developed into 58 statements in the questionnaire. Before data collection, the questionnaire underwent a review process to ensure that all statements were clearly formulated and appropriately worded. The review process showed that all questionnaire items were linguistically appropriate and could be used without modification. The next stage was the instrument validity test. The validity analysis indicated that 40 questionnaire items met the required validity criteria and were retained for data collection, while the remainder were invalid. Therefore, only 40 valid items were included in the final version of the questionnaire. Using a 58-item instrument, the reliability test produced a coefficient value of 0.987. With a reliability coefficient above the 0.70 threshold, the instrument exhibits a high degree of consistency. Consequently, the questionnaire is regarded as a reliable tool for data collection.

Data in this study were obtained through the use of student participation questionnaires as the main instrument, which were distributed prior to and following the implementation of digital literacy-based instruction in Physical Education (Febriyanty et al., 2021). The study was implemented across eight sessions, beginning with a pretest, followed by six treatment sessions, and concluding with a posttest. The intervention was delivered through a digital literacy-based instructional approach supported by multimedia resources, including videos, digital presentations, and internet-based materials covering Physical Education content such as small ball games, rhythmic gymnastics, and physical fitness activities (Yuliawan et al., 2025).

The intervention in this research involved applying digital literacy within Physical Education lessons by integrating a range of digital media into the learning process. Teachers utilized instructional videos, digital presentations, and internet-based media to help students understand the lesson material. Students were also given the opportunity to access digital learning resources and engage in more interactive learning through the use of digital technology throughout the lesson. After all interventions were completed, students again filled out a participation questionnaire to assess changes in their participation levels following the implementation of digital literacy-based instruction..

Data analysis in this research was conducted with the assistance of SPSS (Statistical Package for the Social Sciences). At the beginning of the analysis, descriptive statistics were conducted to determine the mean and standard deviation of both pretest and posttest scores. Subsequently, the Shapiro–Wilk test was applied to assess data normality, considering that the study involved a relatively small sample size. When the significance value was above 0.05 ($p > 0.05$), the data were assumed to follow a normal distribution. With the normality assumption met, differences between pretest and posttest results were examined using a Paired Sample T-Test after the intervention. Based on the decision criterion, a significance value below 0.05 ($p < 0.05$) leads to the rejection of the null hypothesis (H_0) and acceptance of the alternative hypothesis (H_a).

3. RESULTS

Descriptive Analysis

Descriptive statistical analysis was performed to obtain the mean and standard deviation of participants' scores in both the pre-test and post-test phases.

Table 1.

Descriptive Analysis

Test	n	Descriptive statistics	
		M	(Std. D)
Pre-test	36	116,75	(20,80)
Post-test	36	129,94	(17,45)

The descriptive statistics revealed that students obtained higher scores on the posttest than on the pretest after participating in digital literacy-based learning activities. This improvement suggests that student participation increased following the implementation of the instructional intervention in Physical Education classes.

Normality Test

To meet the assumptions of the paired-sample t-test, a normality assessment was first performed to check the distribution of the data. The Shapiro–Wilk test was selected because the study involved a relatively small number of participants.

Table 2.

Table normality test

	Shapiro-Wilk		
	statistic	df	Sig.
pretest	.962	36	.252
posttest	.957	36	.167

The Shapiro–Wilk test produced p-values of 0.252 for the pretest and 0.167 for the posttest. As both values exceeded the 0.05 criterion, the dataset met the normal distribution assumption and was considered appropriate for further statistical procedures.

Hypothesis Testing

With the normality assumption confirmed, hypothesis testing was performed to determine whether significant differences existed between pretest and post-test scores. A Paired Sample T-Test was chosen because the data involved repeated measurements from the same group before and after the treatment.

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Table 3.

Result Hypothesis Testing

	Mean	Std. Deviation	df	Sig. (2-tailed)
Pair 1 Pretest-Posttest	-13.19444	26.63383	35	0,005

The Paired Sample T-Test produced a mean difference of -13.19444, with a p-value of 0.005. As this value was below the 0.05 threshold, the findings confirm a statistically significant difference between students' pretest and posttest performance following the intervention.

Improvements in Student Participation

To identify which aspects of participation improved following the implementation of digital literacy-based instruction, an analysis was conducted on students' participation, covering physical, mental, emotional, and social aspects. The results of the analysis indicate that all aspects of participation improved after the implementation of digital literacy-based instruction in Physical Education classes.

Table 4.

Improvements in Student Participation

Aspects of Participation	Pretest	Posttest	Improvement
Physical	28,72	32,75	4,03
Mental	28,06	31,50	3,44
Emotional	28,42	31,64	3,22
Social	31,56	34,06	2,50

The analysis presented in Table 4 demonstrates that the physical dimension experienced the highest improvement, followed by the mental, emotional, and social dimensions. These findings suggest that digital literacy-based instruction contributed positively to students' involvement in learning activities, especially in relation to physical participation and lesson comprehension.

The overall increase in participation across all measured aspects shows that the implementation of digital literacy-based instruction contributes positively to students' engagement in Physical Education learning activities. The physical aspect showed the greatest improvement, as the use of video-based learning media helped students more easily understand movements and practical learning activities. Meanwhile, improvements in the mental, emotional, and social aspects indicate that the use of digital technology also helps enhance students' attention, motivation, and interaction throughout the learning process.

4. DISCUSSIONS

The results obtained from this study suggest that integrating digital literacy into instructional practices is associated with an increase in student participation in Physical Education classes. Evidence for this finding can be seen in the changes between pretest and posttest scores following the implementation of digital literacy-based instruction. The paired sample t-test showed a significance value of 0.005 ($p < 0.05$), confirming a statistically significant difference between pre- and post-intervention conditions. Overall, the results indicate that digital literacy-based learning contributes to improved student engagement in Physical Education.

Based on the analysis of participation, the physical aspect showed the greatest improvement compared to the other aspects. This result indicates that incorporating digital media, particularly instructional videos and presentation-based materials, helps students more easily understand the movements and activities involved in Physical Education. The integration of visual and interactive learning resources promotes higher levels of student involvement in practical activities during the learning process.

In addition to increasing physical participation, digital literacy-based learning also encourages students' mental engagement throughout the learning process. Students become more active in paying attention to the material, understanding instructions, participating in discussions, and expressing their opinions during learning activities. Digital technology provides learners with access to diverse and readily available learning resources, enhancing flexibility in learning and encouraging independent study.

An increase in students' emotional and social engagement was also evident throughout the learning process. Digital-based learning encouraged students to be more confident, enthusiastic, and active in collaborating with peers during group activities. The application of digital media in collaborative learning settings enhanced students' ability to interact socially and work together effectively in completing Physical Education assignments.

Theoretically, this study's findings are consistent with digital literacy theory, which underlines the importance of individuals' capacity to access, understand, critically evaluate, and effectively use digital information in learning contexts. Digital literacy goes beyond technical proficiency in using technology, extending to students' ability to effectively employ it to enhance engagement and support learning activities. Learning supported by digital technology enables students to gain a clearer understanding of the material while also promoting more active participation in the learning process.

The findings of this study align with the research by (Jastrow et al., 2022) which states that the use of digital technology in physical education can enhance student motivation and engagement in learning. In addition to supporting previous research, moreover, the results of this study provide evidence that digital literacy-based learning can help adapt the physical education learning process to the characteristics of students in the digital age. In the current digital era, students are generally more accustomed to integrating technology into their daily lives, making learning that utilizes digital media more engaging and easily accepted by students. The use of digital-based learning media also helps teachers create a more varied learning environment compared to conventional teaching. Thus, digital literacy-based learning can serve as one of ongoing efforts to enhance and develop the quality of Physical Education instruction in schools. Research by (Wulandari & Aslam, 2022) also indicates that digital literacy has a positive

relationship with the learning process and student learning outcomes. Additionally, study notes that the use of digital technology in Physical Education instruction can enhance the appeal of learning, thereby encouraging students to be more active in participating in learning activities.

The findings of this study suggest that digital literacy-based learning can be used as a teaching strategy to increase student participation in Physical Education classes. In Physical Education, teachers can integrate a range of digital media, including instructional videos, into their teaching practices, such as instructional videos, fitness apps, online learning platforms, other interactive media, to create lessons that are more innovative, engaging, and in line with current technological advancements.

Despite these findings, it is important to acknowledge several limitations, including the absence of a control group and the relatively limited number of participants involved in the study and was conducted on a relatively small sample size within a single school. Therefore, future research is recommended to use a more robust experimental design with a larger sample size so that the findings can be generalized more broadly.

5. CONCLUSIONS

Based on the research findings, it can be concluded that the implementation of digital literacy-based learning in Physical Education classes has led to an increase in student participation at Al-Musaddadiyah High School in Garut. This increase is evident from the higher posttest scores compared to the pretest scores following the implementation of digital literacy-based learning. The results of the hypothesis testing also indicate a significant difference between pretest and posttest scores, suggesting that digital literacy-based learning can help enhance student engagement in the Physical Education learning process.

An increase in student participation was observed in the physical, mental, emotional, and social aspects throughout the learning process. Based on the analysis results, the physical aspect showed the greatest improvement compared to the other aspects. The use of digital media such as instructional videos, digital presentations, and technology-based learning resources helped create a more interactive and engaging learning experience and supported students' active participation in Physical Education activities.

The results of this study indicate that the use of digital technology in Physical Education instruction can serve as an alternative teaching strategy aligned with educational developments in the digital age. Physical Education teachers can utilize various digital platforms and media to enhance the quality of instruction and student engagement throughout the learning process. Additionally, schools can support the implementation of digital literacy-based learning by providing adequate technological facilities to facilitate more innovative and interactive learning processes.

This study suggests that digital literacy-based learning can serve as an alternative instructional strategy to increase student participation in Physical Education classes in high school. Physical Education teachers can utilize various digital media and technologies to create more innovative learning experiences that align with current technological advancements.

However, the findings should be interpreted with caution due to the study's limitation of employing a one-group pretest–posttest design without involving a control group, had a relatively small sample size, and was conducted at only one school. Therefore, future research is

recommended to include a larger sample size and employ a more robust experimental research design so that the findings can be more broadly generalized.

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