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Students' attitudes toward online learning in physical education and their impact on academic performance: challenges and intervention strategies

Actitudes de los estudiantes hacia el aprendizaje en línea en educación física y su impacto en el rendimiento académico: desafíos y estrategias de intervención

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Abstract
The transition to online learning in Physical Education (PE) has posed significant challenges due to the subject's inherently practical and movement-based nature. This study explores students' experiences and attitudes toward online PE, the difficulties they encounter, and its perceived impact on academic performance. A descriptive research design was employed, utilizing a structured questionnaire to gather data from students enrolled in PE courses at Batangas State University, Nasugbu Campus. Findings reveal that while students generally have a positive attitude toward online PE, their engagement is significantly influenced by reliable internet access, device availability, teachers' ability to deliver practical PE lessons online, and the effectiveness of instructional strategies. Key challenges identified include time management, lack of resources, financial constraints, and limited student-teacher interaction. Despite these obstacles, students perceive online PE as effective, particularly for those with strong digital literacy skills. However, weak student-teacher engagement remains a critical concern, affecting participation and skill acquisition. The study underscores the need for improved access to digital tools, enhanced teacher training in online PE delivery, and innovative teaching methods. To address these concerns, implementing blended learning models, real-time feedback mechanisms, and interactive platforms is recommended to optimize student engagement and improve learning outcomes in virtual PE environments.

Keywords: academic performance, instructional strategies, online learning, physical education, student engagement

Resumen
La transición al aprendizaje en línea en la Educación Física (EF) ha planteado desafíos significativos debido a la naturaleza práctica y basada en el movimiento de la materia. Este estudio examina las actitudes de los estudiantes hacia la EF en línea, las dificultades que enfrentan y su percepción sobre el impacto en el rendimiento académico. Se empleó un diseño de investigación descriptivo, utilizando un enfoque basado en encuestas para recopilar datos de estudiantes matriculados en cursos de EF en la Universidad Estatal de Batangas, Campus de Nasugbu. Los resultados revelan que, si bien los estudiantes tienen una actitud generalmente positiva hacia la EF en línea, su participación está significativamente influenciada por la conectividad a Internet, la competencia del docente y las estrategias instruccionales. Los principales desafíos identificados incluyen la gestión del tiempo, la falta de recursos, las limitaciones financieras y la interacción limitada entre estudiantes y docentes. A pesar de estos obstáculos, los estudiantes perciben la EF en línea como efectiva, especialmente para aquellos con habilidades digitales avanzadas. Sin embargo, la baja interacción entre estudiantes y docentes sigue siendo una preocupación crítica que afecta la participación y la adquisición de habilidades. El estudio subraya la necesidad de mejorar la infraestructura digital, capacitar a los docentes en pedagogía en línea y aplicar estrategias instruccionales innovadoras para optimizar la enseñanza de la EF en entornos virtuales. La implementación de modelos de aprendizaje combinado, mecanismos de retroalimentación en tiempo real y herramientas de aprendizaje interactivas puede mejorar la participación de los estudiantes y los resultados de aprendizaje en la EF en línea.

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Palabras clave:

rendimiento académico, estrategias instruccionales, aprendizaje en línea, educación física, participación estudiantil.

Introduction

The COVID-19 pandemic has profoundly disrupted the global education system, forcing a sudden transition from traditional face-to-face instruction to online learning. This shift has significantly altered pedagogical strategies, affecting students, educators, and institutions at all levels (Bell et al., 2020). According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), over 1.37 billion students—roughly 80% of the global student population—were affected by school closures, prompting higher education institutions to adopt digital learning platforms rapidly.

In this context, online Physical Education (PE) presents a unique set of challenges and opportunities. Physical Education, as a discipline, promotes physical, cognitive, and social development through movement-based activities and sports. Its core objective is to enhance human performance, encourage lifelong physical activity, and develop motor skills. However, the transition of PE courses to online formats has raised concerns about maintaining instructional quality, student engagement, and skill acquisition, especially in subjects like PE 103, as offered at Batangas State University–Nasugbu Campus.

Students in online PE environments face specific psychosocial issues, including reduced motivation, lack of peer interaction, and feelings of isolation and anxiety. These are compounded by technological barriers such as weak internet connectivity and limited access to digital devices, particularly in resource-limited areas. While online education does offer benefits such as flexible scheduling, personalized instruction, and innovative digital platforms (Xiao-long, 2025), these opportunities are not always accessible to all students equally.

Student engagement in online PE is closely tied to their attitudes toward digital learning, which are influenced by technological readiness, internet access, and teachers' ability to deliver practical lessons effectively. In developing countries like the Philippines, these factors are critical, as disparities in access and instructional support can significantly

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shape students' experiences (Wahyuni & Ariyanto, 2024). Despite the increasing use of Information and Communication Technology (ICT) in education, there remains a notable gap in research focusing on how students perceive and adapt to online PE—particularly in regions with limited infrastructure and support.

This study aims to address that gap by exploring students' experiences and attitudes toward online Physical Education, particularly in the context of Batangas State University–Nasugbu Campus. It seeks to identify the challenges students face, examine how these influence their academic performance, and recommend strategies to improve online PE delivery. By focusing on the local setting, this research contributes to a better understanding of how virtual PE instruction can be optimized through targeted interventions such as blended learning models, real-time feedback mechanisms, and interactive platforms. These insights will help educators enhance student engagement and ensure meaningful learning outcomes in digitally mediated PE environments.

Online Learning in Higher Education

Online learning has become an integral part of higher education, particularly during the COVID-19 pandemic, which necessitated the shift from traditional classroom instruction to digital platforms (Alghamdi, 2024). E-learning has provided flexibility, accessibility, and cost-effectiveness, enabling students to continue their education remotely (Tian, 2024). However, online education also presents challenges such as digital divide, lack of social interaction, and reduced engagement, especially in courses requiring hands-on participation, such as physical education. Studies have shown that students' attitudes toward e-learning significantly influence their academic success and engagement in virtual classrooms (Menon, 2024).

Students' Attitudes Toward Online Learning

Attitude is a key factor in determining students' success in online learning environments. Research suggests that students with positive attitudes toward e-learning demonstrate higher levels of engagement, self-regulation, and adaptability (Balay-as & Bandoc, 2024). Conversely, students with negative attitudes toward digital education

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often face motivation issues, technological anxiety, and lower academic performance. In physical education, where practical engagement is essential, students' willingness to participate in virtual PE classes plays a crucial role in maintaining learning effectiveness. Additionally, factors such as internet connectivity, teacher competence, and instructional strategies can shape students' perceptions of online learning (Dimo et al., 2024).

The Role of Information and Communication Technology (ICT) in Online Learning

The integration of Information and Communication Technology (ICT) in education has transformed the learning experience, offering tools that enhance collaboration, interactivity, and assessment (Kumar & Pandey, 2024). ICT accessibility is a determining factor in the effectiveness of online education, with limited internet access and inadequate digital resources being major barriers, particularly in developing countries and low-income communities (Dembitska & Кобилянський, 2024). In Physical Education, technology-mediated learning tools, such as virtual simulations, instructional videos, and gamification, have been explored to improve student engagement and learning outcomes (Tariq & Sergio, 2024). However, studies indicate that a lack of familiarity with digital tools can hinder students' ability to fully participate in online PE courses (Ali & Ahsan, 2021).

Challenges in Online Physical Education Learning

Unlike theoretical courses, physical education relies heavily on experiential learning, physical activity, and skill development (Buen et al., 2024). The transition to online PE classes has led to several challenges, including reduced hands-on practice, lack of equipment, and limited teacher-student interaction (Lapesigue, 2024). Students struggle with motivation and engagement in online PE, as the absence of in-person coaching and peer interaction negatively impacts their performance. Furthermore, time management, parental support, and financial constraints have been identified as additional barriers affecting students' participation in online physical education (Akpen et al., 2024).

Academic Performance and Online Learning in Physical Education

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The impact of online learning on academic performance varies depending on students' learning styles, access to resources, and instructional strategies (Babalola & Aina, 2024). Some studies suggest that online education allows for self-paced learning, enabling students to retain information better and apply concepts independently. However, in Physical Education, the lack of direct feedback and physical demonstration can hinder skill acquisition and practical assessment (Murtagh et al., 2023). Additionally, students with higher self-efficacy and digital literacy tend to perform better in online learning environments compared to those who struggle with technology and time management (Xue et al., 2024).

Intervention Strategies to Enhance Online Learning in Physical Education

Given the challenges in online physical education, various intervention strategies have been proposed to enhance student engagement and learning outcomes. Research suggests that interactive learning approaches, such as blended learning models, virtual fitness programs, and peer collaboration activities, can help address engagement issues (Rutkauskaite et al., 2022). Teachers play a crucial role in motivating students, providing clear instructional guidance, and fostering an inclusive learning environment (Mareza, 2024). Moreover, the use of technology-enhanced assessment tools, such as video-based skill evaluations and real-time feedback mechanisms, has been recommended to improve students' academic performance in virtual PE classes (Culajara, 2023).

Methods

Research Design

This study employs a descriptive and cross-sectional research design, appropriate for examining students' attitudes toward online learning in Physical Education (PE) and its impact on academic performance. Descriptive research allows the systematic collection and interpretation of data to understand behaviors, attitudes, and experiences within a population, while the cross-sectional design captures a snapshot of these variables at a single point in time. This design is suitable for identifying trends and correlations in students' learning experiences without implying causality.

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The study uses a structured questionnaire as the main data collection tool to assess students' perceptions, challenges, and perceived academic outcomes in online PE. This approach allows both quantitative insights through closed-ended items and qualitative feedback through open-ended responses. Descriptive statistics such as mean, frequency, percentage, and standard deviation are used to summarize data, while inferential statistics, including correlation and regression analysis, examine the relationships between attitudes, challenges, and academic performance. All statistical analyses are performed using Statistical Package for the Social Sciences (SPSS) to ensure precision and replicability.

To ensure instrument reliability and content validity, the questionnaire undergoes expert validation by three Physical Education specialists—licensed PE teachers and researchers with over five years of teaching and research experience. Feedback from these experts was incorporated to refine questionnaire content, improve clarity, and ensure alignment with the study objectives.

A pilot test involving 30 students enrolled in online PE courses was conducted. Based on the results, items were revised for clarity and relevance. The instrument yielded a Cronbach's Alpha value of 0.89, indicating high internal consistency. According to statistical convention, a Cronbach's Alpha value of 0.70 or higher is considered acceptable, while 0.80 or above indicates good reliability.

The four-point Likert scale used in the questionnaire was chosen to minimize neutrality bias and provide clearer distinctions in responses. It is suitable for measuring attitudes (perception, motivation, engagement), challenges, and perceived performance outcomes.

Participants, Sampling Technique, and Sample Size

The participants are college students from Batangas State University–Nasugbu Campus who were enrolled in Physical Education courses during the 2nd semester of Academic Year 2023–2024. Only students who had completed at least one online PE course were included. Those who had no online PE experience were excluded.

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A stratified random sampling technique was employed to ensure representation across academic programs and year levels. Stratification was based on year level and college program. This method ensures each subgroup is proportionally represented and acknowledges the potential variation in students' online PE experiences due to curricular differences.

Based on the university registrar's data, the total student population enrolled in PE courses was 1,072. Using Slovin's Formula with a margin of error of 5%, the computed sample size was 292 students. Table 1 shows the population per program and the corresponding proportionate samples:

Program	**Population**	**Sample Size**
BEEd	390	106
BPEd	280	76
BSEd-Math	162	44
BSEd-English	120	33
BSEd-Sci	80	22
BSEd-Values	40	11
Total	**1,072**	**292**

While stratified sampling enhances representation, limitations include possible difficulty in accessing specific subgroups due to scheduling or availability.

Instruments

A researcher-made questionnaire served as the primary instrument to measure students' attitudes toward online PE, challenges encountered, and perceived impact on academic performance. The instrument comprises four parts:

1. Demographic Profile – Gathers data on age, sex, year level, academic program, and internet access. These variables help contextualize student experiences and assess subgroup differences.
2. Students' Attitudes Toward Online PE – Covers indicators such as perception, motivation, and engagement using a 4-point Likert scale:
    - 4 – Strongly Agree
    - 3 – Agree
    - 2 – Disagree
    - 1 – Strongly Disagree

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3. Challenges Encountered – Identifies barriers including internet connectivity, instructional methods, device availability, and financial constraints.
4. Perceived Impact on Academic Performance – Measures how online PE affects students' academic outcomes such as grades and skill acquisition. The same 4-point scale is used:
    - 4 – Very Effective
    - 3 – Effective
    - 2 – Moderately Effective
    - 1 – Ineffective

The pilot test results (n = 30) yielded a Cronbach's Alpha of 0.89, confirming the instrument's high reliability. Revisions were made to ensure items were clearly worded and aligned with study objectives.

Data Analysis

The data analysis is divided into descriptive and inferential methods:

Descriptive Analysis:

- Frequency, percentage, mean, and standard deviation summarize demographic variables and responses related to attitudes, challenges, and performance.
- Interpretation thresholds: For Likert scale means: 3.26–4.00 = Strongly Agree/Very Effective; 2.51–3.25 = Agree/Effective; 1.76–2.50 = Disagree/Moderately Effective; 1.00–1.75 = Strongly Disagree/Ineffective.

Inferential Analysis:

- Pearson correlation analysis examines the relationship between attitudes and perceived academic performance.
- Interpretation of correlation strength: 0.00–0.19 = very weak, 0.20–0.39 = weak, 0.40–0.59 = moderate, 0.60–0.79 = strong, 0.80–1.0 = very strong.
- Linear regression identifies the predictive influence of attitudes and challenges on performance.

All analyses were performed using SPSS version 26.

Ethical Statement

This research adheres to ethical standards for human participation. Informed consent was secured from all participants. They were assured of confidentiality, voluntary participation, and the right to withdraw at any time. The questionnaire was validated by three experts in Physical Education, and ethical clearance was obtained from the university's institutional review board prior to data collection. Data were stored securely and used solely for academic purposes.

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By following rigorous ethical procedures, the study upholds integrity, protects participant rights, and contributes reliable findings to the field of online PE research.

Results

This section presents the findings of the study regarding students' attitudes toward online learning in Physical Education (PE) and its influence on academic performance. The results are organized based on the key research objectives: (1) to determine the level of students' attitudes toward online PE, (2) to identify the challenges they encountered, and (3) to evaluate the perceived impact on academic performance. Descriptive statistics, including weighted mean and standard deviation, were used, followed by a discussion supported by relevant literature.

Students' Attitudes Toward Online Learning in Physical Education

Table 1 presents the students' attitudes toward online learning in PE, measured through eight indicators: perception, motivation, engagement, adaptability, self-efficacy, digital competence, satisfaction, and anxiety. Fifteen questions (as recommended for better reliability of each variable) were developed and validated to represent the indicators. A 4-point Likert scale was used, where 4 = Very High, 3 = High, 2 = Low, and 1 = Very Low.

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Table 1 ***Students' Attitudes Toward Online Learning in Physical Education***

Attitude Indicators	Weighted Mean (WM)	Verbal Interpretation	Rank
I am inspired to use online platforms when I have strong internet connectivity.	3.78	Very High	1
I am affected by the slow computer and poor internet connections.	3.76	Very High	2
I feel troubled when I know I don't have strong internet connections.	3.23	High	3
I feel happy using online learning as it makes learning interesting.	3.12	High	4
I found it difficult to favor online learning due to the lack of face-to-face interaction.	2.34	Low	5
I can easily adjust to changes in the online learning setup.	3.18	High	6
I am confident in navigating and using different online learning tools.	3.25	High	7
I feel anxious when I am required to submit video performance tasks.	2.91	Effective	8
I feel satisfied with the feedback I receive from my teacher during online PE.	2.89	Effective	9
I believe I learn better when I am actively participating in online PE activities.	3.10	High	10
Composite Mean	**3.25**	**High**	

The findings indicate that students generally hold a high attitude toward online PE (Composite WM = 3.25). Notably, internet connectivity emerged as the most influential factor, consistent with the findings of Barrot, Llenares, and del Rosario (2021), who emphasized digital access as crucial in distance education. Despite the positive outlook, the lack of face-to-face interaction remains a concern, echoing previous studies (Bates et al., 2020) that highlight its importance in physical education. Support readings such as those by Ferrer et al. (2021) and Allen et al. (2020) reinforce that high attitudes are typically linked to strong engagement, while low attitudes correlate with lack of interaction and low motivation.

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Challenges Encountered in Online Physical Education

Table 2 identifies the main challenges students encountered in online PE classes. Responses were rated using a 4-point Likert scale: 4 = Strongly Agree, 3 = Agree, 2 = Disagree, and 1 = Strongly Disagree.

Table 2 ***Challenges Encountered in Online Physical Education***

Challenge Indicators	Weighted Mean (WM)	Verbal Interpretation	Rank
Time management	3.74	Strongly Agree	1
Lack of materials	3.68	Strongly Agree	2
Internet connectivity issues	3.65	Strongly Agree	3
Lack of financial support	3.61	Strongly Agree	4
Lack of interest	3.60	Strongly Agree	5
Lack of parental support	3.59	Strongly Agree	6
Limited space at home	3.57	Strongly Agree	7
Noise or distractions at home	3.55	Strongly Agree	8
Technical issues with devices	3.54	Strongly Agree	9
Lack of teacher feedback	3.50	Strongly Agree	10
Composite Mean	**3.61**	**Strongly Agree**	

Time management ranked highest (WM = 3.74), reflecting how balancing academic responsibilities and home duties posed a challenge. While often linked to participation, time management can also overlap with lack of interest and poor engagement (Maqsood et al., 2022). Additionally, low parental support suggests a gap in student motivation and accountability, particularly in younger learners, echoing Morgan et al. (2019).

Perceived Impact of Online Learning on Academic Performance

Table 3 evaluates students' perceptions of the impact of online PE on their academic performance. A 4-point Likert scale was used: 4 = Very Effective, 3 = Effective, 2 = Moderately Effective, 1 = Ineffective.

Table 3 ***Perceived Impact of Online Learning on Academic Performance***

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Academic Performance Indicators	Weighted Mean (WM)	Verbal Interpretation	Rank
Students' usability and expertise in computers ensure effective online learning.	2.91	Effective	1
Students perform better in an online learning platform.	2.80	Effective	2
Students' productivity is enhanced during online classes.	2.78	Effective	3
Students appreciate the setup of an online class.	2.67	Effective	4
Student-teacher interaction is weak in online learning.	1.54	Ineffective	5
Students are able to meet learning objectives in online PE.	2.75	Effective	6
Students demonstrate understanding of concepts through online assessments.	2.73	Effective	7
Students' grades are maintained or improved in online PE classes.	2.70	Effective	8
Students exhibit self-discipline in accomplishing tasks online.	2.69	Effective	9
Students retain knowledge and skills learned in online PE.	2.65	Effective	10
Composite Mean	**2.72**	**Effective**	

The results show that while students generally find online PE effective (Composite WM = 2.72), weak student-teacher interaction (WM = 1.54) remains a critical issue. This confirms the findings of Ferrer et al. (2021), who noted that student satisfaction in online PE is significantly affected by teacher feedback and engagement. Academic performance measured by students' grades, productivity, and physical participation is aligned with positive attitudes and strong digital skills (Maqsood et al., 2022).

Discussion

The correlation between students' attitudes and their academic performance underscores the importance of fostering positive perceptions toward online PE. High attitude scores, particularly among students with strong internet access and computer

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skills, suggest that targeted interventions such as digital literacy programs and infrastructure improvements can enhance learning outcomes. Identified challenges—including time management, lack of resources, and low interaction—indicate a need for more flexible learning models. Blended learning, which combines synchronous and asynchronous methods, could provide a more balanced structure, as suggested by Allen et al. (2020).

Furthermore, the findings highlight the importance of personalized learning. Students would benefit from more tailored feedback, interactive platforms, and engagement strategies to combat the absence of physical classroom dynamics. Enhancing teacher-student communication through live sessions or digital feedback loops may also improve performance and engagement.

While this study focused on students' attitudes, future research should examine long-term effects on physical fitness and motor skill development. It is also worth exploring how students from different academic programs perceive online PE differently, considering their unique workloads and curricular demands.

The shift to online learning has significantly transformed the educational landscape, including Physical Education (PE), which traditionally relies on movement-based, hands-on instruction. This study examined students' attitudes toward online PE, the challenges they encountered, and its perceived impact on their academic performance. The findings reveal that while students generally have a positive attitude toward online PE, several factors, such as internet connectivity, teacher engagement, and instructional strategies, influence their overall experience.

One of the most critical factors affecting students' attitudes toward online learning in PE is internet connectivity. The results indicate that students are more engaged and motivated to participate in online PE when they have a stable internet connection. This finding aligns with previous research, which suggests that access to reliable digital infrastructure significantly impacts student participation and motivation in online learning environments (Arwan, 2024). Studies have shown that students in areas with weak internet connectivity struggle to engage in synchronous activities, leading to decreased motivation and limited interaction with instructors and peers (Xiao-long, 2025). The dependency on internet stability for an effective learning experience has also

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been highlighted in research, which reported that technological barriers often contribute to student frustration and disengagement in virtual learning environments (Made et al., 2025). In the context of PE, where real-time participation and movement-based exercises are essential, unstable internet connections further exacerbate these challenges, making it difficult for students to follow instructional videos, receive immediate feedback, or demonstrate physical skills effectively.

Another crucial aspect influencing students' online learning experience in PE is the role of teachers in facilitating virtual instruction. The study highlights those students place high importance on their teachers' ability to provide proper guidance, utilize digital platforms effectively, and create engaging learning experiences. This finding is consistent with the research of Culajara (2020), who emphasized that students in online PE courses rely heavily on instructors to provide structured lessons and interactive teaching methods to compensate for the lack of face-to-face interaction. Previous studies have also suggested that teachers who are well-trained in online pedagogy and proficient in using digital tools can enhance student motivation and engagement (Ali & Ahsan, 2021). In contrast, teachers who struggle to adapt to online platforms may contribute to a decline in student participation and overall learning outcomes (Dimo et al., 2024). The effectiveness of online PE instruction is therefore closely linked to the ability of educators to design interactive, movement-based activities that encourage active student involvement despite the constraints of a virtual learning environment.

Beyond technological and instructional challenges, the findings suggest that students encounter various barriers that affect their engagement in online PE, including time management, lack of resources, and financial constraints. Time management emerged as a significant challenge, as students struggle to balance academic responsibilities, household chores, and other obligations while learning remotely. This aligns with prior research indicating that the unstructured nature of online learning requires students to develop self-regulation and time management skills to succeed (Babalola & Aina, 2024). However, students who lack these skills often experience difficulties keeping up with coursework, which may lead to lower levels of participation and academic performance (Rulida et al., 2024). Additionally, the lack of access to appropriate learning materials and physical education equipment presents another

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obstacle to effective online PE instruction. Studies have shown that students from low-income households face greater challenges in virtual learning due to limited access to technology, inadequate space for physical activities, and financial constraints that prevent them from acquiring the necessary tools for online coursework (Dembitska & Кобилянський, 2024). In PE, where hands-on practice and skill development are integral, the absence of proper equipment and learning resources can hinder students' ability to fully engage with the course content and achieve learning objectives.

The perceived impact of online PE on academic performance provides further insight into students' experiences with virtual instruction. The findings suggest that students with strong digital literacy skills perform better in online learning environments, as they are more comfortable navigating digital platforms, submitting assessments, and utilizing virtual learning resources. This is consistent with the research of Rodafinos et al (2024), who found that students with prior experience using online learning tools demonstrate higher levels of academic success compared to those who struggle with digital literacy. Furthermore, research has shown that students who actively engage in online learning activities, participate in discussions, and take advantage of digital learning tools tend to perform better academically (Anjum & Salah-Ud-Din, 2024). However, a major concern in online PE is the lack of direct interaction between students and teachers, which can negatively impact learning outcomes. The results indicate that students find teacher-student interaction to be weak in an online setting, which aligns with previous studies suggesting that online learning environments often lack the immediacy and responsiveness of face-to-face instruction (Tian, 2024). Research suggests that student engagement improves when instructors incorporate interactive elements such as live virtual demonstrations, gamified learning activities, and real-time feedback mechanisms (Tariq & Sergio, 2024). Therefore, the effectiveness of online PE may be enhanced by adopting strategies that encourage student-teacher interaction and provide more opportunities for real-time engagement.

To address the challenges identified in this study, several interventions can be implemented to enhance the online PE learning experience. First, educational institutions should prioritize improving digital infrastructure by ensuring that students have access to stable internet connections and appropriate learning devices. Studies have shown that

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institutions that invest in digital accessibility experience higher levels of student engagement and academic performance in online learning environments (Pratama et al., 2024). Second, teacher training programs should focus on equipping educators with the necessary skills to effectively deliver online PE instruction. Research indicates that professional development programs that emphasize digital pedagogy, interactive teaching strategies, and the use of technology-driven assessment tools can significantly improve the quality of online education (Dimo et al., 2024). Third, adopting a blended learning approach that combines synchronous and asynchronous learning activities can help address the limitations of online PE. Research suggests that incorporating pre-recorded instructional videos, live virtual coaching, and self-paced fitness activities can enhance student participation and learning outcomes in PE courses (Rutkauskaite et al., 2022).

Furthermore, student support services should be strengthened to address financial constraints and time management issues. Providing academic counseling, time management workshops, and financial aid programs can help students overcome barriers to online learning and improve their ability to succeed in virtual PE courses (Ramli et al., 2024). Additionally, integrating virtual engagement tools such as fitness-tracking apps, online competitions, and digital performance assessments can make online PE more interactive and enjoyable for students (Singh & Awasthi, 2024). By implementing these strategies, higher education institutions can enhance the effectiveness of online PE instruction and ensure that students continue to receive a high-quality education despite the challenges of remote learning.

Overall, the findings of this study highlight both the potential and limitations of online learning in PE. While students recognize the benefits of online instruction, particularly in terms of flexibility and accessibility, they also face significant challenges related to internet connectivity, time management, and teacher-student interaction. These challenges reinforce the importance of developing innovative and adaptive teaching strategies to ensure that PE courses remain engaging and effective in a virtual setting. Moving forward, it is essential for educators and policymakers to continue refining online PE instruction by leveraging digital technologies, enhancing instructional design, and providing students with the necessary resources to succeed in an evolving educational landscape.

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Conclusion

This study examined students' attitudes toward online learning in Physical Education (PE), the challenges they encountered, and its perceived impact on their academic performance. The findings revealed that while students generally have a high attitude toward online PE, their engagement and participation are heavily influenced by internet connectivity, teacher effectiveness, and instructional strategies. The preference for face-to-face instruction remains strong, particularly due to the lack of physical interaction and real-time feedback, which are essential components of PE.

One of the most significant challenges identified was internet connectivity, which directly affected students' motivation and ability to participate in online PE classes. Students with stable internet access showed higher engagement, while those experiencing poor connectivity struggled with frustration and disengagement. Additional barriers included time management, lack of materials, financial limitations, and limited parental support. These challenges align with earlier research suggesting that success in online learning requires not only technical access but also strong self-regulation and resource availability.

Despite these challenges, students generally perceived online PE as effective in enhancing their academic performance—particularly among those who were digitally literate and comfortable with virtual platforms. Students' grades served as a specific and measurable indicator of academic performance, reflecting improved learning outcomes for many learners who could adapt to the digital environment. However, weak student-teacher interaction remained a significant concern, as limited engagement with instructors adversely affected students' learning experiences and hindered motor skill development.

To enhance the quality and equity of online PE, this study recommends several strategic interventions:

- Continuous professional development for educators is essential to ensure they are equipped with the skills and confidence to use digital tools effectively. Mastery of online teaching techniques can significantly address challenges related to student engagement and skill acquisition.

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- Integrating more interactive and engaging digital platforms, such as gamified apps, fitness trackers, and virtual demonstrations, can help simulate physical activity and enhance students' sense of connection and participation.
- A blended learning approach should be adopted, combining the flexibility of online instruction with the experiential benefits of face-to-face learning. This hybrid model offers a more balanced, holistic, and effective PE experience.
- Collaborative efforts among educational institutions, policymakers, and technology providers must be prioritized to ensure equitable access to digital learning resources for all students, regardless of socio-economic status.
- Further research is encouraged to assess the long-term effects of online PE on students' physical fitness, motor skill development, and overall health, especially considering the lasting implications of prolonged digital instruction.
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In conclusion, while online PE offers flexible and modernized instruction, it requires thoughtful and sustained improvements to truly meet students' academic and developmental needs. By implementing innovative teaching methods, expanding teacher training, and strengthening student support systems, institutions can ensure that online PE remains both effective and inclusive—enhancing not only students' academic performance but also their lifelong engagement in physical activity.

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