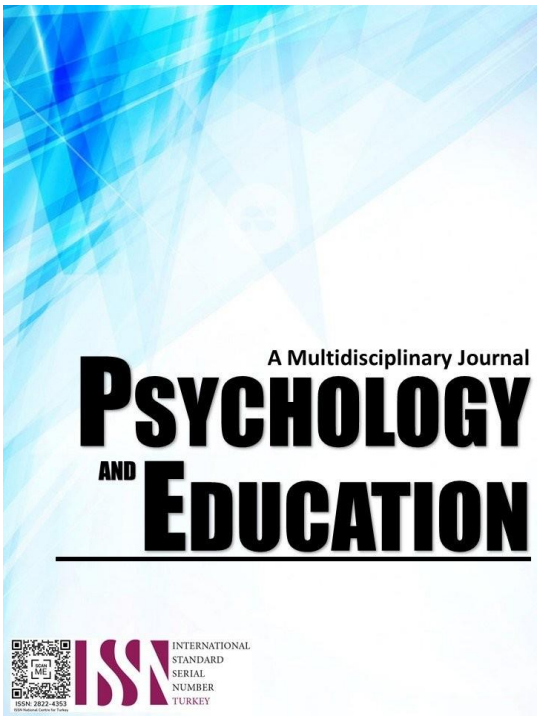
STUDENT ENGAGEMENT AND TEACHERS' PEDAGOGY: PREDICTORS OF STUDENTS' ACADEMIC PERFORMANCE IN PHYSICAL EDUCATION



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

Volume: 25
Issue 6
Pages: 743-755
Document ID: 2024PEMJ2387
DOI: 10.5281/zenodo.13825088
Manuscript Accepted: 09-10-2024

Psych Educ, 2024, **25**(6): 743-755, Document ID:2024PEMJ2387, doi:10.5281/zenodo.13825088, ISSN 2822-4353

Research Article

Student Engagement and Teachers' Pedagogy: Predictors of Students' Academic Performance in Physical Education

Girlie G. Acero,* Jaffy Glenn D. Guillena
For affiliations and correspondence, see the last page.

Abstract

Student engagement and teachers' pedagogy are crucial predictors of academic performance in Physical Education (PE), essential for enhancing educational strategies and improving student outcomes. This study investigated the factors influencing PE academic performance among first-year college students at Liceo de Cagayan University, aiming to explore the causal predictive between student engagement, teachers' pedagogy, and academic performance. Using a quantitative approach with causal-predictive research designs, data were collected through survey questionnaires and analyzed using descriptive statistics, Pearson product-moment correlation, and multiple linear regression. Results showed high levels of student engagement, with emotional engagement (M=4.53, S=0.55), being the highest followed by cognitive (M=4.44, SD= 0.57) and behavioral engagement (M=4.42, SD=0.60). Teachers' pedagogical practices, particularly student-centered, through technology integration scored slightly lower. Students demonstrated excellent academic performance, with the highest mean scores linked to solid engagement and effective teaching practices. Significant correlations were found among behavioral (P=.007), emotional (P=.049), cognitive engagement (P=.020), student-centered approaches (P=.002), technology integration(P=.008), and pedagogical practices (P=.002), with academic performance. However, the data indicated a slight positive relationship, suggesting no single variable or combination of variables significantly predicted academic performance in PE. In conclusion, the study highlighted high student engagement and effective pedagogical practices as vital contributors to excellent academic performance. Despite significant correlations, the small effect size suggests that other unexplored factors may also influence academic success. Future research may explore additional variables and employ diverse methods for deeper insights.

Keywords: *academic performance, behavioral, cognitive, and emotional engagement, Physical Education*

Introduction

Physical Education (PE) is a compulsory component of the curriculum across all educational levels in the Philippines, yet it often needs more attention than other disciplines. Observations suggest that Filipino students show lower engagement in PE, partly due to perceived repetitive teaching methods. Challenges such as online teaching strategies and student engagement have emerged with the evolving educational modalities in the Philippines.

The 1987 Constitution of the Philippines mandates promoting physical education to foster self-discipline, teamwork, and a healthy citizenry (1987 Constitution of the Republic of the Philippines, Article XIV - Section 19). Republic Act No. 5708 further emphasizes integrating physical and mental development through PE and sports programs, assigning the Department of Education to oversee this initiative (Republic Act No. 5708).

From a global perspective, while necessary measures have been taken, some nations have gone above and beyond the call of duty by incorporating innovative physical education principles into their curricula as an integral component of their overall educational program rather than as an isolated course. For instance, rather than making students spend most of their time buried in textbooks and test papers, Finnish school authorities require teachers to incorporate outdoor activities into their courses (Fabian, 2016).

Most people, including students, view Physical Education as a subject that is not so important. Physical Education (PE) in Indonesia has not been considered an important subject, resulting in less time allocated for PE learning than in other subjects such as sciences, mathematics, and social sciences (Leirhaug, 2016). In the article of Fabian (2016), the Philippines' physical education (PE) program has suffered greatly due to the country's decision to place less emphasis on it and the emergence of a quickly evolving young generation heavily reliant on social media and mobile technologies.

Having served as a PE teacher for twenty-eight (28) years, the researcher has observed a similar trend where certain students harbor negative feelings towards the subject, often correlating with lower PE grades. These students typically encounter PE teachers with varying teaching styles—some being approachable and lenient, while others are strict disciplinarians who cause disengagement from the subject.

Research indicates that student engagement, influenced by motivation and intellectual curiosity, is crucial for academic success (Velden et al., 2013). Studies also highlight that students' attitudes toward PE, shaped by their experiences and teachers' approaches, significantly impact their performance and perception of the subject (Zalech, 2021). Addressing these factors is essential, especially in the context of blended learning brought on by the pandemic (Gutierrez et al., 2023).

Thus, this study was conceptualized to explore the impact of student engagement and teachers' pedagogy on the academic performance

of college students in PE. Insights from this research will support the development of strategies to enhance PE teaching and student engagement, benefiting the PE program at Liceo de Cagayan University's School of Teacher Education and potentially informing broader educational practices.

Methodology

Research Design

This study employed the descriptive-correlational and causal research design as this research aimed to examine the connection between the independent and dependent variables and determine the variable that best influences students' academic performance in Physical Education.

Respondents

The study's participants were 320 first-year college students from one of the leading universities in Cagayan de Oro City, aged 18-20, enrolled in Physical Education and Health during the second semester of the 2023-2024 school year. Using the Raosoft Calculator, a sample size calculator for survey research (McCrum-Gardner, 2010), the researcher determined the required sample size from the population of 1,894 students enrolled in the Physical Activity Towards Health and Fitness course through Simple Random Sampling. Based on a 95% confidence level, a 5% margin of error, and an assumed 50% response distribution, the calculated sample size for this study was 320.

Instrument

The study employed survey instruments modified from prior research, notably the Student Engagement in Schools Questionnaire (SESQ) adapted from Hart et al. (2011). This instrument demonstrated strong internal consistency, with a Cronbach's alpha of 0.930 (or 93.0%), indicating high reliability. The SESQ uses a 5-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), with questions categorized into three dimensions of engagement: behavioral (seven indicators), emotional (nine indicators), and cognitive (ten descriptors).

Additionally, the study utilized the Teacher's Pedagogy Survey Questionnaire, adapted from Sonmark et al. (2017), which achieved an even higher Cronbach's alpha of 0.965 (or 96.5%), further underscoring its reliability. This questionnaire also employs the 5-point Likert scale and consists of questions organized into two main categories: student-centered teaching and technology integration, comprising fifteen descriptors.

The respondents' academic performance was assessed using a survey entitled Perception of Academic Performance of Physical Education, which measures students' views on their academic performance in PE. The questionnaires were modified to suit the target respondents better and were validated by a panel of experts from Liceo de Cagayan University Graduate Studies. Before distribution, a pilot study involving thirty participants was conducted to confirm the suitability and clarity of the revised questionnaire.

Procedure

Upon the proposal's approval, the researcher incorporated panel suggestions and submitted the revised paper to the School of Teacher Education for a certificate of approval for data gathering. Permission was then sought from the Office of the University Research and Coordination and the Vice President for Academic Affairs. Following approval, a pilot test was conducted with thirty first-year college students, after which the electronic survey questionnaire was distributed via Google Forms. Permission was also requested from the Vice President for Academic Affairs to access the participants' final grades in PE for the second semester of the school year 2023-2024. The pilot test results were forwarded to a statistician for analysis.

Participants were informed about the study's goal, survey items, and research instruments. They were assured that their participation would not affect their academic status and were informed about potential risks, benefits, and the confidentiality of their data. Participation was voluntary and uncompensated, with no penalties for non-participation. The inclusion criteria targeted PE 2 students enrolled in PATH-FIT 2, while the exclusion criteria excluded non-PE students and out-of-school youth.

The researcher ensured strict adherence to confidentiality and privacy laws, guaranteeing that personal information would remain confidential and that the survey results would be anonymous. The questionnaire took 15-30 minutes to complete during the participants' free time, and only the researcher, adviser, and statistician had access to the data.

Data Analysis

To analyze and interpret the data, this study employed various statistical tools. Descriptive statistics which consisted of the mean and standard deviation, were used to quantify student engagement, teachers' pedagogy, and academic performance for problems 1, 2, and 3. For problem 4, Pearson's Product-Moment Correlation Coefficient was utilized to establish the relationship among the variables.

Finally, multiple linear regression was employed to determine the effect of the independent variables on students' academic performance for problem 5, identifying relationships or influences between the indicators.

Ethical Considerations

The researcher assured that participants' personal information and involvement in the study would remain entirely confidential, adhering to the provisions of the Data Privacy Act of 2012 and the Freedom of Information Act of 2000 (RA 10173). To protect anonymity, participants were not asked to disclose their names, and the reporting of findings ensured no identifying information would be revealed. Confidentiality was rigorously upheld during all phases of data collection, storage, and publication, with access to the data limited solely to the researcher. Participation in the study was entirely voluntary, with no financial incentive other than reimbursement for incurred expenses. Furthermore, participants had the right to withdraw at any point without facing any consequences, and stringent measures were taken to safeguard both their privacy and anonymity.

Results and Discussion

Problem 1. What is the level of engagement of students in their Physical Education classes in terms of: 1.1 behavioral engagement, 1.2. emotional engagement, and 1.3. cognitive engagement?

The study assessed students' behavioral engagement in Physical Education (PE) and extracurricular activities, focusing on active participation, interactions, task adherence, and enthusiasm, which are crucial for learning, skill development, and well-being. The findings in Table 1 show a high overall engagement level with a mean of 4.42 and a standard deviation (SD) of 0.60, indicating general agreement among students about their interest and participation in PE. The highest engagement was noted for students' awareness of their behaviors' impact on learning outcomes (M=4.59, SD=0.503). In contrast, the lowest score was for active participation in extracurricular activities (M=4.07, SD=0.785). Despite high engagement, extracurricular participation variability suggests schools need to address potential barriers and promote consistent student involvement in these activities.

Table 1. *Level of Student engagement among the Participants in terms of Behavioral Engagement*

Indicators	*Mean*	*SD*	*Description*	*Interpretations*
1. I am very interested in learning PE, and I try hard to do well in school.	4.39	.543	Agree	High
2. I participate in PE activities and pay attention in class.	4.59	.517	Strongly Agree	Very High
3. I am an active participant in school activities such as sports day and PE activities.	4.27	.730	Agree	High
4. I take an active role in extracurricular activities in my school.	4.07	.785	Agree	High
5. I believe that my actions and behaviors during PE can either enhance or impede my learning progress.	4.47	.586	Agree	High
6. I am generally aware of how my behaviors during PE activities impact my overall engagement and learning outcomes.	4.59	.503	Strongly Agree	Very High
7. I believe that being behaviorally engaged during PE activities positively influences my learning outcomes.	4.55	.534	Strongly Agree	Very High
Overall Mean	4.42	0.60	Agree	High

The findings align with Martinek et al. (2019), who highlighted the importance of diverse activities, fostering autonomy through teacher-student interactions, and supporting skill development in physical education (PE) classes. Research by Kang and Wu (2022) suggests that behavioral engagement mediates the relationship between academic achievement and enjoyment, with high-engagement students outperforming their peers. Guo et al. (2023) emphasized that students' skill levels and perceived competence significantly influence their participation in physical activities. This underscores the need to enhance students' physical capabilities and self-esteem. Adva (2016) and Dotterer and Lowe (2011) found that cognitive, emotional, and behavioral engagements predict academic success, with behavioral engagement mitigating the impact of emotional involvement on reading ability. Lobo (2022) identified teacher behavioral support as crucial for student engagement in PE. Leisterer and Jekauc (2019) linked positive behavioral experiences in PE to long-term physical activity engagement. Strategies to improve engagement include interdisciplinary programs, increased PE hours, and varied extracurricular opportunities. Enhancing teacher support and professional development can sustain high interest and participation, promoting a healthier, more active student population.

The study assessed students' emotional engagement in PE through affective investment and enjoyment, contributing to overall motivation. Table 2 shows a very high level of emotional engagement with a mean score of 4.53 (SD=0.55), indicating strong agreement and satisfaction with PE instructors and the learning experience. The highest scores were for instructors initiating interactions (M=4.61, SD=0.512) and having clear goals (M=4.60, SD=0.510), reflecting effective teaching methods. Though still high, the lowest scores were for relating new material to prior knowledge (M=4.42, SD=0.587) and practical value explanations (M=4.48, SD=0.576), suggesting room for improvement in these areas.

According to Gonzáles-Peño et al. (2021), teacher behavior in PE influences student engagement, with need-supportive styles being more effective than controlling ones. Lobo et al. (2024) emphasized recognizing and fostering individual interests to enhance engagement. Fierro-Suero (2022) linked motivation in PE to positive emotional experiences, indicating that emotional support from teachers can boost engagement and achievement. The results highlight the significant role of teacher emotional support, as noted by Lobo (2023), in creating a positive atmosphere and addressing students' needs. Enhancements to the Physical Education curriculum in schools can be achieved by sustaining effective teaching strategies and nurturing robust student-teacher relationships, which are

conducive to improved academic outcomes and overall student well-being.

Table 2. *Level of Student Engagement among the Participants in Terms of Emotional Engagement*

Indicators	*Mean*	*SD*	*Description*	*Interpretations*
1. I think what I am learning in PE is interesting.	4.49	.576	Agree	High
2. My PE instructor cares about me as a person and not just as a student.	4.49	.587	Agree	High
3. My PE instructor is willing to help me learn.	4.58	.524	Strongly Agree	Very High
4. My PE instructor encourages me to relate what I am learning in the discussion to what I already know.	4.42	.587	Agree	High
5. The thought of having to attend my PE instructor's lecture makes me feel encouraged.	4.49	.597	Agree	High
6. My PE instructor tries to incorporate students' interests into the lecture.	4.59	.503	Strongly Agree	Very High
7. My PE instructor initiates interactions and discussions that help me learn the subject material.	4.61	.512	Strongly Agree	Very High
8. My PE instructor has a clear goal of what he/she wants to achieve during the lecture.	4.60	.510	Strongly Agree	Very High
9. My PE instructor explains the subject material such that it has practical value for me (i.e., can be related to everyday experiences).	4.48	.576	Agree	High
Overall Mean	4.53	0.55	Strongly Agree	Very High

Cognitive engagement in PE was evaluated through active mental participation, problem-solving, critical thinking, and skill acquisition, fostering overall cognitive development. Table 3 indicates a high level of cognitive engagement with a mean score of 4.44 (SD=0.572). The highest mean score (M=4.52, SD=0.559) was for valuing mental development in PE, followed by real-world application of information (M=4.51, SD=0.553), highlighting the curriculum's effectiveness in promoting cognitive benefits. The lowest mean score (M=4.37, SD=0.594) was for finding PE intellectually stimulating, suggesting potential areas for enhancement.

Table 3. *Level of Student Engagement among the Participants in Terms of Cognitive Engagement*

Indicators	*Mean*	*SD*	*Description*	*Interpretations*
1. When I study, I try to understand the material better by relating it to things I already know.	4.48	.570	Agree	High
2. When I study, I figure out how the information might be useful in the real world.	4.51	.553	Agree	High
3. When studying, I try to combine different pieces of information from course material in new ways.	4.38	.569	Agree	High
4. As a result of taking this course, my ability to think critically (i.e., analyze, interpret, and evaluate information) has improved.	4.39	.561	Agree	High
5. My PE instructor asks insightful and challenging questions to help me understand and learn.	4.41	.586	Agree	High
6. Solving challenges in P.E. encourages me to apply theoretical knowledge to real-life situations.	4.40	.608	Agree	High
7. Engaging in problem-solving tasks during P.E. enhances my ability to think critically and make informed decisions.	4.44	.573	Agree	High
8. I feel that physical education classes help improve my ability to think critically about health and fitness-related topics.	4.47	.548	Agree	High
9. I find physical education classes to be intellectually stimulating and rewarding.	4.37	.594	Agree	High
10. I feel that mental development is an important aspect of my experience in physical education classes.	4.52	.559	Strongly Agree	Very High
Overall Mean	4.44	0.572	Agree	High

Connecting subject matter to real-world contexts is crucial for boosting motivation and engagement (National Physical Education Standards, 2024; Pederson, 2018). Research links physical activity with improved academic performance and cognitive abilities (Donnelly et al., 2016; Burns et al., 2019; Cheval et al., 2023). Engaging in cognitive and physical activities enhances executive function and academic achievement (Schmidt et al., 2015; Petrigna et al., 2022; Egger et al., 2019; Hillman et al., 2009). Combining moderate-to-intense physical activity with cognitive tasks significantly impacts academic performance, emphasizing the importance of both quality and quantity of physical activity (Bruijn et al., 2020; Granacher & Borde, 2017; Kantomaa et al., 2012). Overall, students positively view PE classes and actively engage in cognitive challenges, which teachers can further enhance for holistic development.

Table 4. *Summary of the Levels of Student Engagement among the Participants*

Sub-Variables	*Mean*	*SD*	*Description*	*Interpretations*
Behavioral	4.42	0.60	Agree	High
Emotional	4.53	0.55	Strongly Agree	Very High
Cognitive	4.44	0.57	Agree	High
Overall Mean	4.46	0.57	Agree	High

Table 4 summarizes students' engagement in PE classes, encompassing behavioral, emotional, and cognitive dimensions. The overall mean score is 4.46 (SD=0.57), indicating a high level of engagement across all areas. Emotional engagement scored the highest (M=4.53, SD=0.55), followed by cognitive (M=4.44, SD=0.57) and behavioral engagement (M=4.42, SD=0.60). This well-rounded engagement underscores the importance of maintaining a holistic approach to PE, regularly adapting the curriculum to meet diverse student needs, and optimizing the benefits of physical education.

Theoretical frameworks such as Self-Determination Theory (Deci & Ryan, 2000) and Social Cognitive Theory (Bandura, 1986) support the observed high emotional engagement, highlighting intrinsic motivation and social support as crucial factors. Emotional engagement in PE is linked to enjoyable activities, instructor-student solid relationships, and social interactions, creating a positive environment that enhances overall engagement levels.

Studies emphasize the importance of emotional, behavioral, and cognitive engagement in academic success (Wang & Ye, 2021; Reyes et al., 2012; Ma & Wei, 2022). Emotional engagement, in particular, has a strong correlation with academic achievement. According to Upadyaya and Salmela-Aro (2013), these three interrelated aspects work together to support academic success, with cognitive engagement promoting deep comprehension.

Research also shows that social behaviors in PE, such as participation in social dances, impact socioemotional competencies and academic performance (DIJAMCO, 2023; Trigueros et al., 2020). Therefore, fostering engagement in all three domains—behavioral, emotional, and cognitive—is crucial for students' success in PE and other subjects.

In conclusion, students' high engagement in PE positively affects their overall well-being and academic performance. Emphasizing the broader benefits of physical education, including mental and emotional well-being, can help students, parents, and stakeholders appreciate its value beyond physical fitness.

Problem 2. What is the respondents' assessment of the teachers' pedagogy practices in their Physical Education classes in terms of: 2.1 student-centered approach, and 2.2 technology integration?

The student-centered approach in PE classes, which tailors teaching methods to individual student needs and fosters autonomy, intrinsic motivation, and active engagement, was assessed through student perceptions. Table 5 presents the level of assessment of teachers' pedagogical practices in PE classes in terms of this approach. The overall mean score of M=4.44, SD=.58 indicates high satisfaction with these practices. The findings suggest that PE instructors successfully create a positive and encouraging learning environment.

Table 5. *Level of Participants' Assessment of Teachers' Pedagogy Practices in Terms of Student-Centered Approach*

Indicators	*Mean*	*SD*	*Description*	*Interpretations*
My PE instructor….				
1. motivates me and my classmates, especially those who show low interest in schoolwork.	4.45	.590	Agree	High
2. encourages me to believe I can do well in schoolwork.	4.46	.564	Agree	High
3. provides an alternative explanation for example when I am confused.	4.47	.554	Agree	High
4. keeps me actively participating in the learning experiences.	4.43	.578	Agree	High
5. concerns about my learning style have helped me discover and develop my potential and excel in class.	4.35	.627	Agree	High
6. encourages me to ask questions about things I want to know.	4.42	.593	Agree	High
7. creates meaningful learning experiences has motivated me to come completely prepared for class.	4.44	.573	Agree	High
8. facilitates learning activities that I can apply in real-life situations.	4.47	.553	Agree	High
9. provides us a safe and functional classrooms which encouraged me to pay attention and participate in class.	4.36	.648	Agree	High
10. maintains a classroom atmosphere that encourages me to learn more effectively.	4.38	.633	Agree	High
11. manages time effectively which taught me to value time even when handling daily life activities.	4.48	.548	Agree	High
12. provides simulation-based activities in P.E. to help me bridge the gap between theoretical knowledge and practical application.	4.40	.580	Agree	High
13. uses simulation methods that make P.E. classes more engaging and enjoyable compared to traditional teaching methods.	4.49	.554	Agree	High
14. uses cooperative learning in P.E. fosters a sense of teamwork and camaraderie among students.	4.56	.521	Strongly Agree	Very High
15. engages me in problem-solving tasks during P.E. makes me more confident in overcoming obstacles in various sports and physical endeavors.	4.44	.562	Agree	High
Overall Mean	4.44	0.58	Agree	High

The highest mean score (M=4.56, SD=0.521) was for Indicator 14, which highlights the success of cooperative learning in fostering teamwork and camaraderie among students. The lowest mean score (M=4.35, SD=0.627) was for Indicator 5, regarding the teacher's consideration of students' learning styles, suggesting room for improvement in individualized teaching methods.

These results align with Lathan (2022), who found that student-centered learning raises motivation and engagement levels. Bessa et al. (2021) also support the effectiveness of student-centered strategies in enhancing student autonomy and decision-making power in PE classes. Additionally, Risyanto et al. (2024) emphasized the importance of student-centered learning for adolescent development.

The findings indicate that fostering a supportive learning environment is crucial for PE instructors. Improving individualized teaching methods and continuing to implement student-centered approaches can enhance student satisfaction, engagement, and overall educational outcomes in PE classes.

Table 6. *Level of Participants' Assessment of Teachers' Pedagogy Practices in Their Physical Education Classes in Terms of Technology Integration*

Indicators	*Mean*	*SD*	*Description*	*Interpretations*
My PE instructor…				
1. confidently uses technology for instructional purposes.	4.48	.559	Agree	High
2. makes me believe that integrating technology enhances students' engagement and participation in the learning process.	4.46	.574	Agree	High
3. actively seeks out new and innovative technological tools or resources to enhance my learning.	4.38	.570	Agree	High
4. encourages collaborative learning through the use of digital platforms, fostering interaction and knowledge sharing among students.	4.45	.563	Agree	High
5. employs any available technology to enhance communication and learning.	4.44	.568	Agree	High
6. uses a variety of online teaching-learning methods suitable for the PE content.	4.44	.579	Agree	High
7. uses a variety of online teaching-learning methods to build my character in class, including collaboration.	4.37	.590	Agree	High
8. possesses the skill to teach me how to select appropriate design templates based on the instructional goals.	4.40	.589	Agree	High
9. regularly incorporates various types of technology tools in my lessons (e.g., interactive whiteboards, and multimedia presentations).	4.30	.680	Agree	High
10. encourages students to use technology for collaborative projects and individual learning.	4.38	.597	Agree	High
11. integrates Technology which positively impacts student engagement	4.38	.596	Agree	High
12. encourages me to actively participate in class activities that involve the use of technology.	4.31	.595	Agree	High
13. uses technology for formative assessments to gauge student understanding.	4.34	.577	Agree	High
14. provides timely and constructive feedback to students through technology.	4.41	.536	Strongly Agree	Very High
15. uses of technology positively influence students' academic achievements.	4.43	.544	Agree	High
Over-all Mean	4.39	0.581	Agree	High

The strategic incorporation of digital tools and applications in PE classes, aimed at enhancing teaching methodologies and learning experiences, was assessed through student perceptions. Table 6 summarizes the level of technology integration in PE classes, revealing an overall mean score of M=4.39, SD=.581, indicating high student agreement on the positive impact of technology in their learning experiences. This underscores the importance of technology in fostering participation, teamwork, and improved learning outcomes in physical education.

The highest mean score (M=4.48, SD=.559) was for the indicator, "My PE instructor is confident in using technology for instructional purposes." This highlights the critical role of technical competence in contemporary PE instruction, suggesting that a teacher's confidence in using technology effectively influences student engagement and teaching effectiveness. Enhancing this confidence through ongoing professional development can further improve technology integration in PE, creating innovative and memorable educational experiences.

Conversely, the lowest mean score (M=4.30, SD=.680) was for the indicator regarding the regular incorporation of various technological tools, such as interactive whiteboards and multimedia presentations. This suggests variability and a need for more consistent use of technology in PE instruction. Addressing this inconsistency through adequate training and resources can maximize the educational benefits of technology, enhancing student engagement and learning outcomes.

Despite the high overall scores, a disconnect between technology and physical education persists, possibly due to financial constraints, lack of ICT competence, or resistance to technology among PE instructors (Kretschmann, 2015). Addressing these barriers is crucial for effective technology integration.

Bailey (2023) found that formal instruction and teamwork could equip teachers with the skills needed to integrate technology effectively, promoting positive social development and preparing students for the 21st century. However, a substantial gap exists between conceptual understanding and the practical application of technology in classrooms (Regen et al., 2019).

The 21st century's rapid technological advancements have enabled teachers to engage students globally using on-demand resources, supplementing traditional textbooks with reliable information from around the world (Pierce, 2017; Geer et al., 2017). Kuehl (2018) emphasized the need for educators to stay updated with technological advancements to prepare students for a digitally connected

society. Schools play a crucial role in advancing instructor training and teaching through effective professional development (Parrish & Sadera, 2020).

Instructors with more student-centered values use technology more frequently in classrooms, indicating that school culture shapes teachers' perceptions of technology's role (Bice & Tang, 2022). Providing professional development tailored to the degree of technological integration among teachers can foster better educational outcomes.

In conclusion, while students generally agree on the benefits and efficacy of technology in PE, there is room for improvement. Teachers can create engaging and productive learning environments by addressing variability in technology integration, providing comprehensive professional development, and promoting equitable access to resources. Embracing technology innovations aligned with student-centered approaches can lead to better educational outcomes and higher student satisfaction in PE classes.

Table 7. *Summary of the Mean Scores for the Level of Assessment of the Teachers' Pedagogy Practices in Their Physical Education Classes*

Sub-variables	*Mean*	*SD*	*Description*	*Interpretation*
Student-centered approach	4.44	0.58	Agree	High
Technology integration	4.39	0.58	Agree	High
Over-all Mean	4.42	0.58	Agree	High

Integrating technology with student-centered approaches in physical education enhances pedagogical innovation and raises student engagement. This dual focus necessitates continuous support for teachers to advance their pedagogical skills and effectively use technology. Regular student feedback is crucial to adapting physical education programs to meet evolving educational dynamics and diverse student needs.

Table 7 summarizes the mean scores for assessing teachers' pedagogical practices in physical education. The overall mean score of M=4.42, SD=.58 indicates high student agreement on the importance of student-centered methods and technology integration in creating engaging physical education curricula. Prioritizing these factors helps teachers create dynamic learning environments that promote holistic development, encourage student participation, and prepare students for future challenges.

The highest mean score (M=4.44, SD=0.58) reflects students' perception of PE classes being designed with their individual needs in mind. Technology integration also received a high rating (M=4.39, SD=0.58), though slightly lower, suggesting that while necessary, it may not be as impactful as student-centered approaches.

A student-centered approach aligns with humanistic and constructivist educational theories, emphasizing active learning and critical thinking. This method boosts motivation and engagement by granting students greater autonomy over their learning. Technology integration can enhance this by providing digital tools and platforms that support cooperation, communication, and self-directed learning (Kretschmann, 2015).

However, teachers often need more skills and resources for effective technology integration, emphasizing the need for comprehensive teacher preparation programs (Baert, 2021). Effective practices for incorporating technology in PE include gamification and smartphone apps, which can further enhance student engagement and learning (Darling-Hammond et al., 2020).

Research indicates that technology use in PE promotes active learning and a deeper understanding of subjects (Mishra & Koehler, 2017). This method supports inquiry-based learning, critical thinking, and problem-solving. Integrating technology into PE creates a dynamic and engaging learning environment that accommodates diverse learning styles and fosters a more profound comprehension of physical education concepts.

In conclusion, integrating technology with student-centered approaches in PE is essential for creating engaging and effective learning environments. Continuous professional development and support for teachers, aligned with regular student feedback, can help maximize the benefits of this integration, leading to improved educational outcomes and student satisfaction.

Academic performance in physical education was evaluated based on students' perceptions, focusing on their knowledge, skills, physical fitness, and understanding of concepts. This included skills proficiency, participation, and theoretical knowledge, contributing to their overall educational development.

Table 8 shows the students' academic performance levels in physical education, with an overall mean score of M=4.52, SD=.57, interpreted as excellent. This suggests students excel in participation, preparation, and personal responsibility, although there is room for improvement in leadership skills, maintaining physical activity levels, and applying game and movement concepts.

The highest mean score (M=4.63, SD=.548) was for participation in various activities, followed by preparation (M=4.61, SD=.523) and personal responsibility (M=4.60, SD=.537). These high scores indicate that well-rounded physical education programs promote student engagement and skill development. To continue improving, teachers should focus on enhancing leadership and group dynamic skills (M=4.37, SD=.635), maintaining physical activity (M=4.38, SD=.623), and applying game and movement concepts (M=4.43, SD=.609).

Table 8. *Student's Level of Academic Performance in Their Physical Education Classes*

Indicators	*Mean*	*SD*	*Description*	*Interpretations*
1. I come prepared for class, on time, and have proper attire.	4.61	.523	Agree	Excellent
2. I participate in a variety of activities	4.63	.548	Agree	Excellent
3. I apply body mechanics in movement activities.	4.59	.534	Agree	Excellent
4. I engage in movement, motor, and athletic skill development activities.	4.58	.548	Agree	Excellent
5. I participate in personal fitness activities.	4.57	.548	Agree	Excellent
6. I work to remain physically active.	4.38	.623	Agree	Very Satisfactory
7. I work on health-related fitness (cardiovascular, strength, flexibility, muscular endurance).	4.45	.595	Agree	Very Satisfactory
8. I understand & can pose/solve movement challenges.	4.45	.621	Agree	Very Satisfactory
9. I understand and apply game and movement concepts.	4.43	.609	Agree	Very Satisfactory
10. I understand and apply group dynamics and concepts of fair play.	4.52	.564	Agree	Excellent
11. I understand the application and impact of a lifelong active healthy lifestyle.	4.59	.552	Agree	Excellent
12. I demonstrate cooperative and socially responsible behaviors.	4.55	.533	Agree	Excellent
13. I demonstrate personal responsibility.	4.60	.537	Agree	Excellent
14. I demonstrate leadership and group dynamic skills.	4.37	.635	Strongly Agree	Very Satisfactory
15. I demonstrate and apply an active healthy lifestyle.	4.44	.590	Agree	Very Satisfactory
Overall Mean	4.52	0.57	Agree	Excellent

Hastie (2022) emphasized the importance of teaching pedagogy in raising student engagement. His study found that student-centered methods, including technology use, significantly impact engagement and academic achievement. Additionally, culturally competent curricula can boost student enthusiasm and involvement (Flory & McCaughtry, 2014).

Sangco (2022) highlighted the positive perceptions of cooperative teaching methods, showing a strong link between interactive teaching and student academic achievement in PE. Effective teaching styles are crucial for transferring competencies in physical education courses.

Various factors influence students' academic engagement, including peers, teachers, teaching style, and individual traits (Mercer & Dörnyei, 2020).

Compared to primary or secondary education, university students typically enjoy greater autonomy and are expected to manage their learning and progress. However, the shift to tertiary education can be demanding, impacting resilience, anxiety, and self-concept (Amerstorfer et al., 2021). These challenges can influence students' engagement and interest in their studies.

In conclusion, integrating student-centered approaches and technology in physical education can enhance engagement and academic performance. Continuous professional development and culturally competent curricula are essential for fostering an inclusive and dynamic learning environment.

Problem 4. Is there a significant relationship between the students' Physical Education academic performance and: 4.1 student engagement, and 4.2 teachers' pedagogy?

Table 9. *Results of the Pearson r Correlation Analysis for the Significant Relationship Between Students' Physical Education Academic Performance and Student Engagement and Teachers' Pedagogy*

Variables	*N*	*R*	*Effect Size*	*P-value*	*Interpretation*
Behavioral engagement	320	.150	Small	.007	Significant
Emotional engagement	320	.110	Small	.049	Significant
Cognitive engagement	320	.130	Small	.020	Significant
Engagement of Students	320	.140	Small	.012	Significant
Student-centered approach	320	.170	Small	.002	Significant
Technology integration	320	.149	Small	.008	Significant
Teachers' Pedagogical Practices	320	.169	Small	.002	Significant

Table 9 shows the results of Pearson R Correlation Analysis, revealing significant positive correlations ($p<.05$) between students' academic performance in PE and variables such as behavioral, emotional, and cognitive engagement, student-centered approach, technology integration, and teachers' pedagogical practices. Although the effect sizes are small, these correlations are statistically significant, indicating that even minor improvements in these areas can enhance academic performance. This aligns with Self-Determination Theory (Deci & Ryan, 1985) and Social Cognitive Theory (Bandura, 1986), which emphasize intrinsic motivation and the social environment's role in learning. The importance of fostering a supportive and stimulating learning environment is echoed in studies by Christenson et al. (2013), Mercer and Dörnyei (2020), and Skinner and Pitzer (2013).

Techniques such as the Socratic method and discovery approach can enhance engagement by promoting critical thinking and intrinsic motivation (Mercer & Dörnyei, 2020). Additionally, appealing task design and clear learning objectives can emotionally and

cognitively engage students (Mercer & Dörnyei, 2020). Positive student-teacher relationships, characterized by trust, respect, and support, are crucial for academic engagement and success (Hagenauer & Volet, 2014; Amerstorfer et al., 2021). Teachers' caring and credibility further contribute to a nurturing learning environment, fostering student interest and resilience (Pishghadam et al., 2018; Duffy, 2018). Autonomy and self-direction in learning processes enhance students' agency and engagement (Amerstorfer, 2020). In conclusion, a holistic approach that integrates behavioral, emotional, and cognitive engagement, supported by effective pedagogical practices and positive student-teacher relationships, is essential for improving academic performance in Physical Education.

Problem 5. Which among the independent variables, singly or in combination, best predicts students' academic performance in their Physical Education classes?

Table 10. *Results of Multiple Regression Analysis for the Variables that Singly or in Combination Significantly Best Predict/s Students' Academic Performance in Physical Education Classes*

Variables	*Unstandardized Coefficients*		*Standardized Coefficients*	*t*	*Sig.*	*Interpretation*
	B	*Std. Error*	*Beta*			
(Constant)	3.71	.274		13.520	.000	Significant
Behavioral engagement	.137	.093	.138	1.476	.141	Not Significant
Emotional engagement	-.022	.106	-.026	-.209	.834	Not Significant
Cognitive engagement	.016	.116	.018	.136	.892	Not Significant
Engagement of Students	-.106	.224	-.104	-.475	.635	Not Significant
Student-centered approach	-.116	.149	-.139	-.782	.435	Not Significant
Technology integration	.277	.186	.314	1.489	.138	Not Significant
		R=.195	R2=.038 F (6,313) = 2.06	p = .057		

Table 10 presents the results of multiple regression analysis predicting students' academic performance in PE. The R-value of .195 indicates a weak positive relationship, and the R2 value of 0.038 shows that the variables explain only 3.8% of the variability in academic performance. This limited explanatory power suggests that behavioral, emotional, and cognitive engagement, along with student-centered approaches and technology integration, do not significantly predict PE performance ($p>.05$). However, engaging teaching methodologies, meaningful content, and authentic tasks can enhance student engagement (Amerstorfer, 2020; Skinner & Pitzer, 2013; Mercer & Dörnyei, 2020).

Problem-based learning (PBL) was particularly motivating, fostering teamwork and self-regulated learning, which were seen as beneficial for knowledge retention and real-world application (Amerstorfer, 2020). PBL also promotes positive student-teacher relationships, with teachers acting as facilitators rather than authoritative figures, enhancing academic engagement (Filipenko & Naslund, 2016; Ansarian & Teoh, 2018).

Behavioral engagement includes participation, inquiry, and attentiveness, while cognitive engagement involves self-regulation and goal focus (Bakker et al., 2014; Connell & Wellborn, 1991, as cited by Abubakar et al., 2017). Emotional engagement reflects a sense of belonging and enthusiasm for learning (Finn, 1989, as cited by Abubakar et al., 2017). In summary, creating a motivating, supportive, and engaging learning environment is crucial for improving students' academic performance in PE.

Conclusions

The study's findings reveal significant correlations among various variables, illuminating the examined hypotheses. Emotional engagement recorded the highest mean score, indicating a strong positive connection and motivation among students during PE classes, closely followed by cognitive engagement, which reflects active thinking and understanding of class materials. Though slightly lower, behavioral engagement remained high, demonstrating active participation and recognition of its importance for positive learning outcomes. The overall high results confirm consistent engagement across all aspects of Physical Education, highlighting the program's success in fostering student involvement and enthusiasm. The study also indicates that teachers effectively use diverse teaching strategies, particularly student-centered approaches and technology integration, reflecting student needs and engagement prioritization. Students exhibited excellent academic performance, especially in activities participation, class preparation, and personal responsibility. Although leadership skills, physical activity maintenance, and game understanding showed weaker scores, they still indicated high performance. Despite statistical significance, the effect size of these correlations was small, suggesting a moderate association between student engagement, teachers' practices, and academic performance. Other unexplored variables may significantly contribute to students' PE performance, indicating that these factors alone may not fully explain students' academic success in Physical Education.

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Affiliations and Corresponding Information

Girlie G. Acero
Liceo de Cagayan University – Philippines

Dr. Jaffy Glenn D. Guillena
Liceo de Cagayan University – Philippines