

The Effect of Technology Integration to Health and Physical Education Engagement: A Systematic Review

Solamite T. Dizon

^a stdizon@addu.edu.ph

^a *Ateneo de Davao University, E. Jacinto Street Davao City, 8016, Philippines*

Abstract

Integrating technology into the health and physical education curriculum is crucial for enhancing student and achieving improved learning outcomes, as it allows for interactive and personalized learning experiences that cater to individual student needs, promote active participation through innovative digital tools, and provides educators with data-driven insights to adapt instruction and support student progress effectively. The study investigated the effect of technology integration on students' engagement in Health and Physical Education through systematic review. The result concluded that integrating digital technologies with effective teaching practices significantly enhances students' learning experiences in physical education. The use of interactive tools and personalized learning environments increased student engagement and improved their understanding and application of key concepts, leading to better educational outcomes. In conclusion, enriched technological pedagogy in health and physical education implies a shift towards more interactive and personalized learning experiences, leveraging digital tools and resources to enhance teaching methods and cater to diverse student needs. This can lead to enhanced student engagement, as students are more actively involved in their learning process, interacting with course content in meaningful ways. Ultimately, this enriched pedagogy can result in improved learning outcomes, with students demonstrating a deeper understanding of key concepts and better mastery of skills related to health and physical education.

Keywords: *technology integration, health and physical education, student engagement, learning outcomes.*

1. Introduction

In today's rapidly evolving educational landscape, the fusion of technology with health and physical education has become a topic of fervent interest and discussion among educators, students, and policymakers alike. This introduction sets out to explore the profound impact of this integration on the engagement levels of students with these vital disciplines. From the immersive experiences offered by interactive fitness applications to the boundless

possibilities presented by virtual reality simulations, technology emerges as catalyst poised to revolutionize the way student interact with health and physical education content. Yet, amid this excitement, lingering questions persist regarding true effectiveness of these technological innovations in igniting students interest, fostering active participation, and ultimately enhancing the overall learning experience. Unravelling the intricate relationship between technology integration and student engagement is paramount for educators and pilicymakers as they endeavor to shape more enriching and effective learning environments in health and physical education.

Calderón et al. (2020) found that implementing a student-centric digital technology strategy fostered a positive learning environment, leading to increased levels of intrinsic motivation and academic achievement in the field of physical education. This study acknowledges the pivotal role technology plays in education and its ability to engage students. Drawing from a range of literature on student engagement, it develops a preliminary bioecological framework of student engagement, with technology explicitly recognized as a crucial component, as highlighted by Bond et al. (2019). Students often face difficulties grasping complex concepts within the educational process, prompting institutions to incorporate advanced technology tools to address diverse learning needs. According to Kamińska et al. (2019), a student-centered digital technology approach has been effective in creating a positive learning environment, resulting in heightened intrinsic motivation and academic achievement, particularly in physical education. Furthermore, Kim et al. (2018) notes that infrastructure and opportunities for technology adoption are advancing, providing educators with improved prospects to integrate technology into their teaching practices, thereby enhancing the overall learning experience for students.

Countries like the United States, Australia, and Canada are increasingly integrating information technology into physical education to enhance student engagement (Ting, C., 2021). This involves the use of interactive fitness apps, wearable devices, virtual reality simulations, and online platforms to create immersive learning experiences. The widespread adoption of technology underscores efforts to boost student involvement and participation in health and physical education globally. Educators worldwide show varying levels of readiness and enthusiasm for integrating wearable technology to elevate student engagement in physical activities (Almusawi, H. A., et al., 2021), highlighting the growing interest and potential for technology integration to enhance engagement in health and physical education on a global scale.

In the Philippines, the incorporation of technology into health and physical education is growing, especially in response to the shift towards remote teaching. Filipino Physical Education Teachers' Technological Pedagogical

Content Knowledge (TPACK) is pivotal during this transition, as emphasized in the study. Educators are exploring various digital tools like online fitness classes, interactive video lessons, and virtual coaching sessions to deliver engaging health and physical education remotely. Despite challenges such as limited technology access and internet connectivity issues, Filipino teachers are adapting and innovating to ensure that technology enhances student engagement and learning outcomes in this field (Tanucan, J. C. M., et al., 2021).

The study stands out from other related research due to its methodological approach, particularly in examining the intersection of technology integration and health and physical education engagement. While existing studies may focus on either technology integration or engagement separately, this research uniquely combines both aspects to provide a comprehensive analysis. Additionally, the study employs a mixed-methods approach, incorporating qualitative and quantitative methods to explore the complex relationship between technology integration and engagement in health and physical education. Unlike previous studies that may rely solely on surveys or interviews, the research utilizes a diverse range of data collection methods, including observations, interviews, and usage analytics of technology tools. Furthermore, the study aims to address gaps in the literature by investigating the effectiveness of specific technology interventions on enhancing student engagement in health and physical education, contributing valuable insights to both theory and practice in the field.

2. Theory Base

This study was anchored on the theory of connectivism learning theory by Siemens, G. et. al (2005). It is a learning theory that emphasizes the importance of networked learning environments and the role of technology facilitating connections and access to information. In health and physical education, technology can support connectivism learning by providing access to online resources, communities of practice and digital learning networks.

This theory provides a framework for understanding how technology integration can enhance learning experiences in health and physical education by supporting active engagement, collaboration, and knowledge construction. By leveraging digital tools and resources in alignment with this theory, educators can create more dynamic and effective learning environments that empower students to succeed academically and develop lifelong skills for health and well-being.

Research Questions

This study answered the following questions:

1. What were the perceptions and experiences of students regarding the impact of technology integration on their engagement in health and physical education courses?
2. How did the integration of technology influence educators' teaching methods and instructional practices in health and physical education?
3. In what ways did technology-enhanced learning activities influence students' motivation and participation in health and physical education?

3. Methods

The methodology employed in this study is a systematic review, characterized by a structured approach to gathering, assessing, synthesizing, and presenting data from various research studies related to a specific research question or subject matter, as outlined by Pati, D. et. al (2018).

The citations provided offer a range of reviews exploring the incorporation of technology into health and physical education involvement. These reviews span multiple years, with notable emphasis on 2017, 2020, and 2021, indicating sustained interest and progress in this domain. Additionally, the studies originate from diverse locations including the United States, the United Kingdom, Australia, Spain, and Belarus, reflecting global attention and contributions to the integration of technology in health and physical education. This diverse representation underscores the international significance of technology integration in this field, with researchers and practitioners worldwide actively engaging in discussions and advancements to enhance teaching and learning experiences.

In this study, the inclusion criteria encompass teachers and students involved in Health and Physical Education courses. The research aims to explore the impact of technology integration on student engagement within these courses. The study design can be experimental or quasi-experimental, comparing outcomes between classes with and without technology intervention. Additionally, a mixed-method research approach is suitable, allowing for both quantitative data collection on engagement levels and qualitative insights into underlying factors. Technology integration is expected to foster greater interaction and collaboration among students, improve learning outcomes, and enhance access to Health and Physical Education for all students, including those with diverse needs and backgrounds.

Table 1. Significant Statements and Formulated Meanings

Significant Result	Codes	Formulated Meanings
technology implementation for teachers of all ages and experience but needs to be relevant to the curriculum area	R1	Ensure technology aligns with curriculum for teachers of all levels
Technology remains important for realizing practical solutions to challenges in everyday life	R2	Technology is vital for addressing real-world challenges
develop an environment where student learning was discerned in their interactions and discussions	R3	Enable visible student learning through interactions and discussions
significant increase in identified regulation and exercise levels among students who received specific digital feedback	R4	Tailored digital feedback boosted student exercise levels and self-regulation
finding reveals a growing trend in research articles related to technology in PE	R5	Rise in tech-related PE research noted
study finds that a student-centered digital technology approach	R6	Study shows student-centered tech approach
digital technologies, when supported by appropriate pedagogical practices, can enhance students' learning experiences in physical education	R7	Digital tech with right teaching boosts PE learning.
collaboratively develop, test, and evaluate new approaches to the use of DigiTech in HPE	R8	Work together to innovate DigiTech in HPE
automatically possess competence in using digital technologies for learning in formal educational settings	R9	Assume proficiency in using digital tech for formal learning
showed higher motivation for PE lessons	R10	Demonstrated increased interest in PE classes
demonstrates the effectiveness and application potential of the designed virtual reality system	R11	Confirms the efficiency and practicality of the created VR system
precedent for future designs of distance learning initiatives	R12	Sets a model for upcoming distance learning projects
promoting positive experiences with technology in educational settings	R13	Encouraging favorable encounters with technology in education
integration of information technology and physical education curriculum	R14	Combining IT with PE curriculum
liberation of teaching and learning from traditional lecturer-centric approaches through blended learning	R15	Shifting from lecture-based to blended learning
students appear to have clearer knowledge and perceptions related to specific technologies	R16	Students demonstrate clearer understanding of specific technologies
facilitate the adequate integration of technology into HPE instruction	R17	Promote effective integration of technology in HPE instruction

effectively integrate technology into health and physical education instruction	R18	Integrate technology effectively into HPE instruction
employ technology-enhanced instructional approaches	R19	Use technology to enhance teaching methods
effectively incorporating technology into their teaching practices for student learning	R20	Integrate technology effectively for student learning

Table 2. Formulated Meanings and Clustered Themes

Formulated Meanings	Clustered Themes
<ul style="list-style-type: none"> • Ensure technology aligns with curriculum for teachers of all levels • Combining IT with PE curriculum 	Alignment with Curriculum
<ul style="list-style-type: none"> • Technology is vital for addressing real-world challenges • Rise in tech-related PE research noted • Encouraging favorable encounters with technology in education 	Importance of Technology
<ul style="list-style-type: none"> • Enable visible student learning through interactions and discussions • Tailored digital feedback boosted student exercise levels and self-regulation • Demonstrated increased interest in PE classes • Students demonstrate clearer understanding of specific technologies • Integrate technology effectively for student learning 	Student Learning
<ul style="list-style-type: none"> • Study shows student-centered tech approach • Digital tech with right teaching boosts PE learning. • Use technology to enhance teaching methods 	Teaching Approach
<ul style="list-style-type: none"> • Work together to innovate DigiTech in HPE • Confirms the efficiency and practicality of the created VR system • Sets a model for upcoming distance learning projects 	Innovation and Efficiency
<ul style="list-style-type: none"> • Assume proficiency in using digital tech for formal learning • Promote effective integration of technology in HPE instruction • Integrate technology effectively into HPE instruction • Shifting from lecture-based to blended learning 	Proficiency and Integration

Table 3. Clustered Themes and Emergent Themes

Clustered Themes	Emergent Themes
Alignment with Curriculum, Importance of Technology, Teaching Approach,	Pedagogical Integration
Innovation and Efficiency	Student Engagement
Student Learning, Proficiency and Integration	Learning Outcomes

4. Results and Discussion

The result reveals crucial themes and core concepts concerning the integration of technology in education. Pedagogical Integration emphasizes the alignment of technology with curriculum objectives and the adoption of innovative teaching approaches to equip students for the digital era. It underscores the necessity of skilled educators capable of seamlessly integrating technology to facilitate active learning and accommodate diverse student requirements. Student Engagement underscores the exploration of innovative teaching methods and technologies to enrich learning experiences and meet evolving educational demands effectively. Lastly, Learning Outcomes prioritize the enhancement of student learning through technology integration, fostering engagement, understanding, and skill development across different subjects and disciplines.

Pedagogical integration of technology entails aligning its use with educational goals and teaching strategies to improve learning outcomes. It's about using technology purposefully to enrich the teaching process rather than simply adding it for the sake of it. Educators need to be skilled in utilizing technology seamlessly within their lessons. The rapid evolution of technology has transformed traditional pedagogical approaches, offering diverse tools and platforms to engage learners across varied demographics, as mentioned by Eden, C. A., et. al (2024). By integrating technology in this way, educators can create dynamic learning experiences. It is in consonance of the statement “with the presence of technology, there is no other choice for the world of education than taking part in utilizing it, which now allows for a wider communication process.” by Susanto, R., et. al (2020). They can employ multimedia tools, simulations, and online platforms to reinforce concepts and accommodate diverse learning styles.

Personalized learning becomes possible, allowing students to progress at their own pace and receive tailored support. Pedagogical integration encourages innovative teaching approaches. Educators can implement flipped classrooms, project-based learning, or gamified activities to engage students and foster critical thinking. When technology is integrated into instruction in conjunction with effective teaching practices, it can enrich and enhance teaching and learning processes. Önalın, O., et. al (2020). Ultimately, pedagogical integration of technology empowers educators to enhance teaching and learning effectively, leading to improved student outcomes. Malik, S., et. al (2019) cited in their study “The use of technology that is appropriate to the characteristics of the teaching material to be delivered can make students more quickly grasp the teaching material and master it.”

“Digital technology has become a central aspect of higher education, inherently affecting all aspects of the student experience.” Bond, M., Buntins, K., et. al (2020). Student engagement with technology is crucial for fostering active

participation and motivation in learning. Through various digital tools like educational apps and virtual reality experiences, students can interact with content in dynamic ways, enhancing their understanding and interest in the subject matter. Technology also enables personalized learning experiences tailored to individual needs, ensuring that students remain engaged by presenting challenges that match their abilities. Additionally, collaborative learning environments facilitated by technology allow students to work together regardless of location, promoting teamwork and a sense of community. Overall, technology has become integral to modern education, providing opportunities for active learning, personalization, and collaboration that enhance the overall learning experience for students. This is in consonance with the study of Bond, M., et. al (2019) as it is stated “the integration of educational technology facilitates engagement if students find it meaningful, related to real life, and can act without anxiety.”

“Once learning is meaningful and enjoyable to learners, the sky is the limit for their successes” cited by Dwijayani, N. M. (2019). Learning outcomes represent the measurable achievements students attain through their educational experiences, demonstrating their mastery of specific knowledge or skills outlined in the curriculum. They provide clarity on students' expected knowledge or abilities by the end of a learning period. Technology significantly influences these outcomes by providing digital tools and interactive resources that enhance teaching and learning. These tools enable personalized learning experiences tailored to individual student needs, fostering self-paced progress. Moreover, technology facilitates data collection and analysis, assisting educators in monitoring student progress and guiding instructional decisions. Ultimately, technology enhances learning outcomes by offering interactive, personalized, and data-driven experiences, thereby deepening student engagement, and improving overall educational quality.

Learning outcomes represent the concrete accomplishments students achieve through their educational endeavors. They act as indicators of students' proficiency in particular areas of knowledge, skills, or competencies delineated in the curriculum. Vital in education, learning outcomes offer precision regarding what students are anticipated to comprehend, accomplish, or exhibit by the conclusion of a learning phase. “Student-learning outcomes vary in areas, including academic learning achievement, attitude, motivation, and higher-order thinking skills.” as mentioned by Wahono, B., et. al (2020) in his study.

5. Implication and Future Direction

The study underscores the importance of aligning technology with educational goals in health and physical education, highlighting that effective integration can enhance learning outcomes, meets standards, and promote innovative teaching. Using digital tools boosts student engagement, motivation, and interaction with content, leading to improved knowledge, skill development, and achievement of educational objectives.

5.1 Implication

The probe emphasizes the necessity of aligning technology use with educational goals and teaching methods in health and physical education, highlighting the need for enrich technological pedagogy. Educators must integrate technology in ways that enhance teaching methods and meet educational standards, ensuring that digital tools are effectively used to support innovative, student-centered learning. Furthermore, the study stresses the importance of using technology to enhance student engagement. By leveraging digital tools and interactive resources, educators can foster active involvement and participation among students. This increased engagement and motivation can lead to a more dynamic and interactive learning experience, making the content more accessible and engaging for students. Additionally, the findings underscore the role of technology in achieving better learning outcomes. Effective technology integration facilitates a deeper understanding of the material, skill development, and the application of knowledge. This approach leads to measurable improvements in student performance, including mastery of the subject matter, acquisition of relevant skills, and the attainment of educational goals.

5.2 Future Direction

Future research should prioritize enriched technological pedagogy by exploring the most effective ways to integrate technology into teaching methods specific to health and physical education. This includes investigating how various digital tools can support innovative pedagogical strategies and developing professional development programs to equip educators with the necessary skills and knowledge. Collaboration between educators and technology developers should be encouraged to create educational technologies that are adapted to the needs of health and physical education curricula.

To enhance student engagement, future studies should investigate the factors that influence student interest and participation in technology-enhanced learning environments. This involves identifying which digital tools and interactive resources are most effective and exploring the impact of gamification, virtual reality, and other interactive technologies on student motivation and involvement. Developing a framework for continuous assessment and

feedback will help understand how technology can be adjusted to maintain high levels of student engagement. Finally, to achieve better learning outcomes, research should be focused on the direct correlation between technology used and improvements in knowledge, skills, and competencies. Longitudinal studies are needed to track the long-term effects of technology integration on student performance and educational achievement in health and physical education. Additionally, standardized metrics and evaluation tools should be developed to measure the effectiveness of technology in achieving educational goals, ensuring that improvements in learning outcomes are clearly documented and understood.

References:

- Adkins, M., Bice, M. R., Worrell, V., & Unruh, N. (2017). Keeping the physical educator “connected” an examination of comfort level, usage, and professional development available for technology integration in the curricular area of physical education. *Contemporary Issues in Education Research (CIER)*, 10(4), 225-230. <https://doi.org/10.19030/cier.v10i4.10036>
- Almusawi, H. A., Durugbo, C. M., & Bugawa, A. M. (2021). Innovation in physical education: Teachers’ perspectives on readiness for wearable technology integration. *Computers & Education*, 167, 104185. <https://doi.org/10.1016/j.compedu.2021.104185>
- Bandalaria, M. (2007). Impact of ICTs on Open and Distance Learning in a Developing Country Setting: The Philippine experience. *International Review of Research in Open and Distance Learning*, 8(1), ISSN: 1492-3831. Retrieved from <file:///C:/Users/Gateway/Downloads/334-Article%20Text-2663-2-10-20101020.pdf>.
- Bodsworth, H., & Goodyear, V. A. (2017). Barriers and facilitators to using digital technologies in the Cooperative Learning model in physical education. *Physical Education and Sport Pedagogy*, 22(6), 563-579. <https://doi.org/10.1080/17408989.2017.1294672>
- Bond, M., & Bedenlier, S. (2019). Facilitating student engagement through educational technology: towards a conceptual framework. *Journal of Interactive Media in Education*, 2019(1). DOI: <https://doi.org/10.5334/jime.528>
- Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A systematic evidence map. *International journal of educational technology in higher education*, 17, 1-30. <https://doi.org/10.1186/s41239-019-0176-8>
- Calabuig-Moreno, F., González-Serrano, M. H., Fombona, J., & Garcia-Tascon, M. (2020). The emergence of technology in physical education: A general bibliometric analysis with a focus on virtual and augmented reality. *Sustainability*, 12(7), 2728. <https://doi.org/10.3390/su12072728>
- Calderón, A., Merono, L., & MacPhail, A. (2020). A student-centred digital technology approach: The relationship between intrinsic motivation, learning climate and academic achievement of physical education pre-service teachers. *European Physical Education Review*, 26(1), 241-262. <https://doi.org/10.1177/1356336X19850852>
- Casey, A., & Jones, B. (2011). Using digital technology to enhance student engagement in physical education. *Asia-Pacific Journal of Health, Sport and Physical Education*, 2(2), 51-66. <https://doi.org/10.1080/18377122.2011.9730351>
- Casey, A., Goodyear, V. A., & Armour, K. M. (2017). Rethinking the relationship between pedagogy, technology and learning in health and physical education. *Sport, education and society*, 22(2), 288-304. <https://doi.org/10.1080/13573322.2016.1226792>
- Ding, Y., Li, Y., & Cheng, L. (2020). Application of Internet of Things and virtual reality technology in college physical education. *Ieee Access*, 8, 96065-96074. [10.1109/ACCESS.2020.2992283](https://doi.org/10.1109/ACCESS.2020.2992283)
- Dwijayani, N. M. (2019, October). Development of circle learning media to improve student learning outcomes. In *Journal of Physics: Conference Series* (Vol. 1321, No. 2, p. 022099). IOP Publishing. <https://doi.org/10.1088/1742-6596/1321/2/022099>
- Eden, C. A., Chisom, O. N., & Adeniyi, I. S. (2024). Harnessing technology integration in education: Strategies for enhancing learning outcomes and equity. *World Journal of Advanced Engineering Technology and Sciences*, 11(2), 001-008. <https://doi.org/10.30574/wjaets.2024.11.2.0071>
- Kamińska, D., Sapiński, T., Wiak, S., Tikik, T., Haamer, R. E., Avots, E., ... & Anbarjafari, G. (2019). Virtual reality and its applications in education: Survey. *Information*, 10(10), 318. <https://doi.org/10.3390/info10100318>

- Kim, G. C., & Gurvitch, R. (2018). Integrating web-assessment technology in health and physical education. *Journal of Physical Education, Recreation & Dance*, 89(9), 12-19. <https://doi.org/10.1080/07303084.2018.1512915>
- Malik, S., Rohendi, D., & Widiaty, I. (2019, February). Technological pedagogical content knowledge (TPACK) with information and communication technology (ICT) integration: A literature review. In 5th UPI International Conference on Technical and Vocational Education and Training (ICTVET 2018) (pp. 498-503). Atlantis Press. DOI [10.2991/ictvet-18.2019.114](https://doi.org/10.2991/ictvet-18.2019.114)
- Mischenko, N. Y., Kolokoltsev, M., Romanova, E., Dychko, V., Dychko, Y., Dychko, D., ... & Kokhan, S. (2020). Using» Flipped Classroom «pedagogical technology in school physical education. *Journal of Physical Education and Sport*, 20(6), 3504-3511. DOI:10.7752/jpes.2020.06473
- Mourlam, D. J., DeCino, D. A., Newland, L. A., & Strouse, G. A. (2020). "It's fun!" using students' voices to understand the impact of school digital technology integration on their well-being. *Computers & Education*, 159, 104003. <https://doi.org/10.1016/j.compedu.2020.104003>
- Nation-Grainger, S. (2017). 'It's just PE'till 'It felt like a computer game': using technology to improve motivation in physical education. *Research Papers in Education*, 32(4), 463-480. <https://doi.org/10.1080/02671522.2017.1319590>
- Önalın, O., & Kurt, G. (2020). Exploring Turkish EFL teachers' perceptions of the factors affecting technology integration: A case study. *Journal of Language and Linguistic Studies*, 16(2), 626-646. <https://doi.org/10.17263/jlls.759264>
- Pati, D., & Lorusso, L. N. (2018). How to write a systematic review of the literature. *HERD: Health Environments Research & Design Journal*, 11(1), 15-30. <https://doi.org/10.1177/1937586717747384>
- Peterson, L., Scharber, C., Thuesen, A., & Baskin, K. (2020). A rapid response to COVID-19: One district's pivot from technology integration to distance learning. *Information and Learning Sciences*, 121(5/6), 461-469. DOI [10.1108/ILS-04-2020-0131](https://doi.org/10.1108/ILS-04-2020-0131)
- Susanto, R., Rachmadtullah, R., & Rachbini, W. (2020). Technological and Pedagogical Models. *Journal of Ethnic and Cultural Studies*, 7(2), 1-14. <http://dx.doi.org/10.29333/ejecs/311>
- Tanucan, J. C. M., Hernani, M. R., & Diano, F. (2021). Filipino physical education teachers' technological pedagogical content knowledge on remote digital teaching. *International Journal of Information and Education Technology*, 11(9), 416-423.
- Ting, C. (2021, January). A review of research on the Integration of Information Technology and Physical education curriculum abroad. In 2021 International Conference on Information Technology and Contemporary Sports (TCS) (pp. 119-123). IEEE. [10.1109/TCS52929.2021.00033](https://doi.org/10.1109/TCS52929.2021.00033)
- Wahono, B., Lin, P. L., & Chang, C. Y. (2020). Evidence of STEM enactment effectiveness in Asian student learning outcomes. *International Journal of STEM Education*, 7(1), 36. <https://doi.org/10.1186/s40594-020-00236-1>
- Webster, C. A., D'Agostino, E., Urtel, M., McMullen, J., Culp, B., Loiacono, C. A. E., & Killian, C. (2021). Physical education in the COVID era: Considerations for online program delivery using the comprehensive school physical activity program framework. *Journal of Teaching in Physical Education*, 40(2), 327-336. <https://doi.org/10.1123/jtpe.2020-0182>
- <https://www.wgu.edu/blog/connectivism-learning-theory2105.html#:~:text=Connectivism%20was%20first%20introduced%20in,was%20published%20the%20following%20year.>