



An empirical study on the impact of mobile learning apps on college students' physical education learning

Un estudio empírico sobre el impacto de las aplicaciones de aprendizaje móvil en el aprendizaje de educación física de los estudiantes universitarios

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Abstract

Introduction: The objective of this study was to assess the mobile learning apps on the college students' physical education with an emphasis on skill acquisition, theoretical knowledge, motivation, and learning engagement.

Following the philosophy of positivism, the study's guide was deductive reasoning, it employed primary quantitative methods and secondary qualitative reviews. Data was gathered through questionnaires which were administered to a sample of 100 students and their responses analyzed with statistical software SPSS.

The study found that mobile applications enhanced students understanding of theoretical concepts in PE to a large extent while the improvement in the students' physical skills was moderate. Students' motivation and commitment towards learning were enhanced by the gamified and interactive nature of the content. On the downside, the lack of standardized content in the application and unequal access to technology among learners undermined the overall impact mobile applications could make. The findings of the qualitative analysis added to the initial findings by primary data as they showcased in the literature provided some of the same conclusions.

The overall findings of the study indicate that mobile learning applications positively influence the defined objectives of the education framework often referred to as PE, but without appropriate access and well-planned integration into the curriculum, the applications are rendered ineffective.

Keywords

Physical Education; mobile learning apps; college students; skill acquisition; motivation.

Resumen

Introducción: El objetivo de este estudio fue evaluar las aplicaciones móviles de aprendizaje en la educación física de estudiantes universitarios, con énfasis en la adquisición de habilidades, el conocimiento teórico, la motivación y el compromiso con el aprendizaje.

Siguiendo la filosofía del positivismo, la guía del estudio fue el razonamiento deductivo, empleó métodos cuantitativos primarios y revisiones cualitativas secundarias. Los datos se recopilieron mediante cuestionarios que se administraron a una muestra de 100 estudiantes y sus respuestas se analizaron con el software estadístico SPSS.

El estudio encontró que las aplicaciones móviles mejoraron en gran medida la comprensión de los estudiantes de los conceptos teóricos en educación física, mientras que la mejora en las habilidades físicas de los estudiantes fue moderada. La motivación y el compromiso de los estudiantes con el aprendizaje se vieron mejorados por la naturaleza gamificada e interactiva del contenido. Como desventaja, la falta de contenido estandarizado en la aplicación y el acceso desigual a la tecnología entre los estudiantes socavaron el impacto general que las aplicaciones móviles podrían tener. Los hallazgos del análisis cualitativo, sumados a los hallazgos iniciales de los datos primarios, tal como se mostraron en la literatura, proporcionaron algunas de las mismas conclusiones.

Los resultados generales del estudio indican que las aplicaciones de aprendizaje móvil influyen positivamente en los objetivos definidos del marco educativo, a menudo denominado EP, pero sin un acceso adecuado y una integración bien planificada en el currículo, las aplicaciones se vuelven ineficaces.

Palabras clave

Educación física; aplicaciones de aprendizaje móviles; estudiantes universitarias; adquisición de habilidades; motivación.

Introduction

The use of mobile technologies in education, or mobile learning (m-learning) in particular, has arguably had the most impact on how students interact and engage with curriculum content. The PE (Physical Education) discipline, like many other educational subjects, has tended to focus on the practical aspects of learning through teaching, participation, and doing (Bracho-Amador et al. 2023). Participative learning is not an exception to the mobile learning trend in education; in fact, the use of mobile learning apps is changing the way college students' access, comprehend, and practice PE content. This is important because, besides enhancing students' physical fitness, PE helps in the development of various motor skills, coordination, self-discipline, team spirit, and the adoption of lifelong healthy living habits. M-learning's impact on students' learning of PE in college has not been thoroughly studied, which presents a huge gap in scholarly work. Unlike theoretical subjects, exercises in PE require students to receive instant feedback using visuals where they can see themselves or hear over the PE-specific mobile applications (Gil-Espinosa et al. 2022). Many applications today feature video and animated tutorials that explain and demonstrate movements, and allow users to track their fitness progress and assess their performance in real time. The use of these innovations may convert active learning in PE into a more individualized, convenient, and technological approach. Nevertheless, the degree to which these applications have impact on the college student's perception of human physiology and biomechanics, their skill acquisition, motivation and engagement, as well as promotion of physical activities, is still uncertain and needs empirical research.

Problem statement

Although mobile learning technologies, or m-learning, have been increasingly integrated into different academic subjects, their relative effectiveness or appropriateness in relation to mobile learning applications in the context of physical education (PE) has not received due attention. Invoked as the PE subject relies fundamentally on the physical depiction of activities, the instructor's feedback, active participation, and skillful performance, all of which may not be fully achieved through an app-based learning system. Many mobile apps, such as fitness trackers, planners, and health modules, provide video tutorials along with real-time analytics and gamified incentives (Tsie, 2022). It remains to be seen, however, what impact these offerings actually have on learning outcomes in PE, such as motor skill acquisition or appreciation and understanding of biomechanics, safety in exercise, and sustained engagement in physical activity. Most existing research concentrates on the theoretical or more sedentary disciplines where consumption of content is passive. This leaves a critical gap in the available empirical evidence regarding the impact of mobile applications on learning in physically active, skill-based educational contexts.

Additionally, concern has been raised regarding the relevance app technology has to education as it applies to the recreational activities of students who use PE apps for leisure as opposed to academic study. Other issues include no instructor supervision, sporadic usage of the tools, self-assessment inaccuracy, and minimal institutional acceptance of mobile aids. In scenarios where safety, posture, and progressive overload are vital, following expert unmonitored app instructions may lead to the use of dangerous techniques and the risk of injury. In addition to these considerations, disparities in availability, motivation, digital literacy, and retention foster additional questions regarding the fairness and longevity of mobile PE learning (Dey and Kumar, 2024). It becomes clear that there is a need to examine the impact mobile learning applications have on physical education learning among college students, not just in terms in academic achievement and skill mastery, but also the behavioral and motivational elements. This challenge must be tackled in order to guide educators, app developers, and institutions on the appropriate and effective measures to adopt regarding the use of mobile technologies for teaching physical education.

Research significance

This research is important in filling the gap of understanding the impact mobile learning apps have on college students' physical education (PE) outcomes. By attempting to prove that m-learning tools can assist in achieving PE educational objectives, the study will try to balance practical skill acquisition with theoretical knowledge. The results will aid in enhancing the effectiveness of technology in PE classes by assisting educators in shifting their attention to engaging, motivating, and performance-focused curricula. Learners' App developers will understand the educational and user need insights, which will enable



them to design appropriate, safe, and pedagogically sound PE applications (Qureshi et al. 2021). Institutions will access verifiable data aimed at suggesting the adoption or improvement of blended learning frameworks in PE programs. Policymakers will be informed on the issues of equity and accessibility and the enduring impacts of digital resources in health education concerning policy formulation. Ultimately, this research will aid in bridging the gap created by the lack of proper integration of technology in physical education, focusing on the need for enhanced healthier lifestyles and improved learning among college students.

Aim and Objectives

The aim of this research is to empirically examine the impact of mobile learning apps on college students' physical education learning in terms of skill development, knowledge acquisition, motivation, and engagement.

Research Objectives

1. To evaluate how mobile learning apps influence students' physical skill performance in PE.
2. To assess the role of mobile apps in enhancing students' theoretical understanding of PE concepts.
3. To analyze students' motivation and consistency in using mobile apps for PE learning.
4. To identify challenges and limitations of integrating mobile apps into college-level PE programs.

Research questions

1. How do mobile learning apps affect the physical performance and skill acquisition of PE students?
2. In what ways do these apps support or hinder the theoretical learning of PE topics?
3. What is the level of student motivation and regularity in using PE-related mobile apps?
4. What barriers exist in effectively integrating mobile learning apps into college physical education?

Literature Review

The implementation of mobile learning applications in physical education (PE) classes is receiving attention as schools and educational institutions look for new ways to improve engagement and meet learning objectives. Mödinger et al (2022), have evaluated the impact of mobile applications on the development of PE skills highlight that visual presentation and video instruction of practical or physical techniques enhance students' understanding of movements. Users of PE apps with motion analysis features often demonstrate better control over posture and technique accuracy than those who are shown the techniques in class. These results, however, depend on the students' level of mastery over the tasks and the features offered by the application. The enhancement of theoretical knowledge through mobile apps has also been investigated. The incorporation of interactive elements like quizzes, infographics, and audio explanations within PE applications increases the retention level of students pertaining to anatomy, physiology, and sports science. Nonetheless, the absence of uniformity in the educational content presented across different apps poses a challenge concerning the use of such applications in formal PE classes.

In regards to motivation, achievement badges, leaderboards, and social sharing capabilities have positively impacted user activity. Zulkifli and Danis (2022) have defined the users of gamified PE mobile applications exercise more frequently than traditional learners over set durations. Nevertheless, the lack of subsequent intervention suggests that more attention is required to maintain motivation within the apps. The failure to integrate apps into curricula can be attributed to inadequate institutional support, insufficient educator training, and concerns regarding student safety due to potential unsupervised practice. Furthermore, variances in class digital devices disproportionately impact access and usage reliability, especially for students from lower socioeconomic backgrounds. Lack of regular internet connection or modern smartphone ownership diminishes access to, and consequently, the benefits of app-based learning tools in PE (Diekhoff and Greve, 2023). In summation, the literature illustrates the advantages and disadvantages of mobile applications in the context of physical education and college-



level pedagogical aims. Advanced Works unaddressed remain needs where analytic work of the educational value of such applications testing criteria of cognitive, physical, and behavioural disciplines in PE programs.

Method

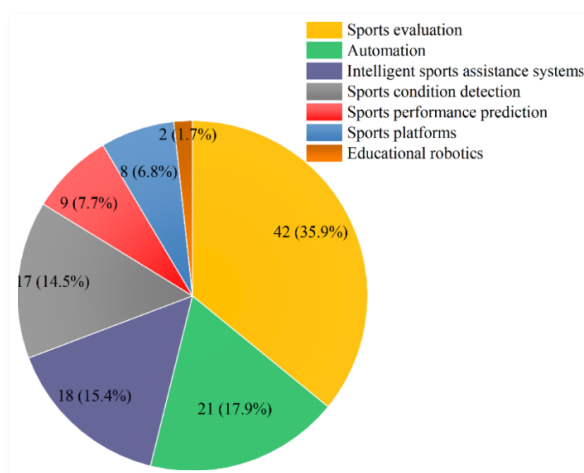
A secondary qualitative method was used in this research to further understand the contextual mobile learning sensations in physical education. This approach included the integrated review and thematic synthesis of a variety of secondary data, such as journal articles, institutional reports, governmental policy documents, and previous case studies on digital learning in PE. These materials contained rich qualitative evidence of learner behavior, teacher perception, implementation issues, and the role of technology's impact in schooling. Secondary data was retrieved from purposive sampling based on, relevance, credibility, document publication date within the last five years, and value. Content analysis served to extract themes, trends, and contradictions from the literature that were collected. This qualitative analysis counterbalanced the quantitative outcomes by offering further explanation and real-world applicability. Relying on secondary data minimized direct expenditure for labor, time, and resources needed for primary qualitative data collection. This was a beneficial inclusion as it addressed the overall study enhanced, validated, and improved understanding of mobile learning app usage in instructional physical education sessions through diverse institutional frameworks and learner profiles.

Results

The Expanding Role of Mobile Learning Apps in Physical Education learning development

In higher education institutions, physical education serves a broad purpose. It isn't just taking an obligatory credit. Rather, it aims to promote proper wellness and active living habits for the long haul. With habits that don't require much physical exertion, especially using digital devices, on the rise among the sedentary college-aged population, the need for efficient PE teaching methods is greater than ever before.

Figure 1. Role of AI based application in Physical Education

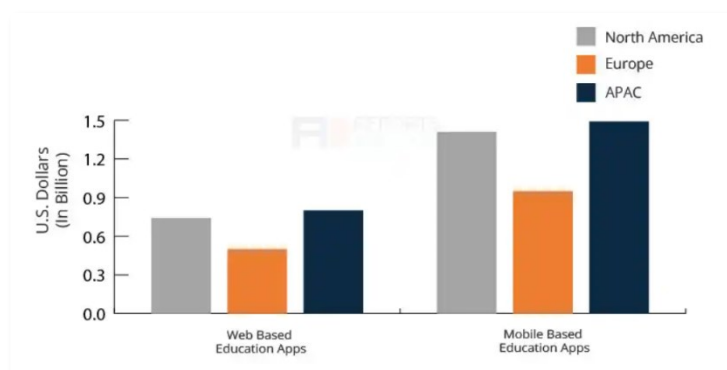


(Source: Zhou *et al.* 2024)

M-learning apps can promote innovation and convenience, but they can also lead to decreased physical activity if misapplied (Abduljawad and Ahmad, 2023). For this reason, knowing if m-learning apps improve or hinder the learning results in PE is extremely important. In fact, research shows that a good number of students use some of these mobile apps such as Nike Training Club, MyFitnessPal, Strava, and FitOn to either supplement their coursework or stay fit.



Figure 2. Rate of technology integration in physical education



(Source: Report sand data, 2022)

The above figure indicates the rate of technology-based application integrated in physical education over the years. These applications assist users in following specific workout regimens, tracking caloric intake, offering augmented reality form correction, and even hosting virtual community challenges that foster social accountability. Nonetheless, these engagements have yet to be quantitatively assessed in relation to formal PE learning outcomes defined by skill acquisition, physical endurance, participation level, and knowledge retention (Linh, 2023). Most importantly, the gap between users who engage with m-learning apps for recreational fitness and those engaging with them for academic PE purposes must be examined for assessing educational value.

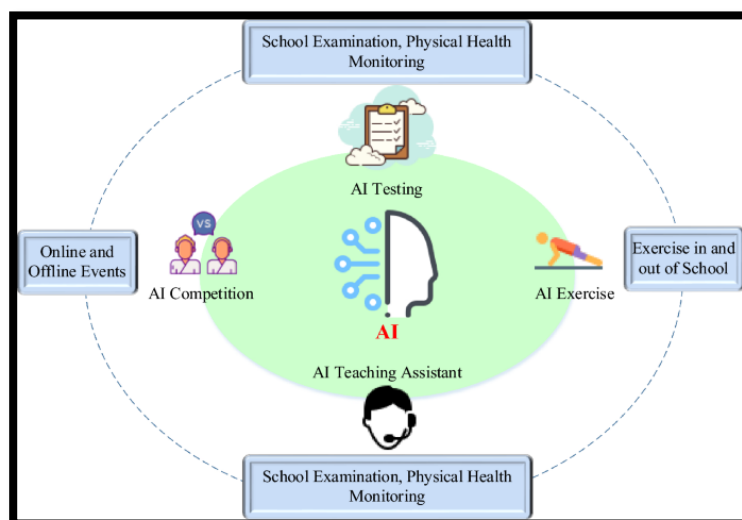
Cognitive and Theoretical Learning through Mobile Applications

Also, college level PE includes practical as well as theoretical work like exercising business understanding of kinesiology, sports nutrition, anatomy, and injury prevention. Mobile applications are incorporating modules or content that address cognitive areas via quizzes, game-based learning or using infographics and audio lessons. Those may be tailored to aid blended learning approaches. For example, a student who has difficulty performing a particular skill may be able to follow along better with slow-motion videos or step-by-step walk-throughs which can be shown slower than a traditional classroom setting (Yahya *et al.* 2025). In addition, they can offer information on the achievement of set goals which enhances self-reflective learning and goal setting behavior. But there is still some doubt regarding the student's ability to self-regulate, the appraisal given by the application, and the digital gap that exists and limits equitable use of such tools across different socio-economic levels. In PE where correct form and safety is super important, the risk of injury or doing some refining of incorrect techniques due to reliance on probably flawed app feedback is a concern.

The Role of Instructors and Institutional Support in App-Based PE

In addition, mobile applications in PE should be analyzed with regard to the level of instructor participation and institutional support. Unlike autonomous learning apps utilized for the theoretical components of a subject, supervisors are generally required for PE lessons to ensure that tasks are performed safely and correctly. The absence of face-to-face teaching in lessons where apps are used does pose a risk that the quality of instruction will be impaired, unless teachers take an active role in directing the use of the app and content and data from the app are formally assessed.

Figure 3. Mode teaching in technology based physical education learning



(Source: Song, 2024)

Some colleges have started adopting hybrid PE modules, which combine app-based teaching and students attending classes in person (Asare *et al.* 2023). These models hold a lot of potential for providing tailored instruction and for flexible scheduling, particularly for students with disabilities or those who have scheduling conflicts. And some of these hybrid models still do not have comprehensive evaluation strategies in place to assess instructional design in a systematic way. A gap exists in the literature examining the effectiveness of e-learning as most have focused on the general use of e-learning resources while mobile learning within the cognitive, social, psychological, and pedagogical frameworks of Physical Education is unexplored.

Gamification and Its Impact on Student Motivation

Moreover, the mobile Physical Education (PE) application poses an equally important area of research in relation to the motivational role of gamification within educational exercises. Game mechanics like achievement trophies, progress leaderboards, and social accolades are implemented to increase participation and adherence to exercise protocols. Among younger adults, coupled with academic and lifestyle changes, motivation to engage in physical activity becomes difficult. These gamification elements may help prompt students to partake in exercises routinely. There are frequent gaps and inconsistencies in using these applications over a semester or academic year, leading to a drop in utilization once academic demands increase or novelty wears off (Alonso-Fernández *et al.* 2022). This poses challenges pertaining to the mobile PE apps' capabilities for educational use and their need for development toward more adaptable, integrated-with-the-curriculum frameworks. Additionally, differences in gender-related patterns of app use, accessibility, and cultural attitudes towards fitness and technology may shape the efficacy of the pedagogical PE offered in the app.

Addressing the Research Gap and Purpose of the Study

Although mobile learning applications have the potential to transform physical education at the college level, their efficacy in terms of learning, physical activity, and student motivation needs to be validated. Specifically, it is important to assess the impact of these applications on the different elements of physical education, including but not limited to information knowledge, skill acquisition, health behavior change, and health behavior maintenance (Asare *et al.* 2023). This study seeks to address this gap by assessing the impacts of mobile learning applications on college students' physical education learning to provide tangible evidence that can guide educators, application designers, and policy formulators. Given the unique aspects of physical education as it can be taught and learned through mobile technology, this study will add to the discourse surrounding technology in education and health promotion in higher education.

Table 1. Conclusive table from the result

Focus Area	Key Findings	Impact
Physical Skills	Moderate improvement; apps help but can't replace real-time instructor feedback	Moderate
Student Motivation	Gamified features (badges, leaderboards) boosted motivation but declined over time	High (initial)
App Engagement	Initial usage high; dropped without curriculum integration	Moderate
Access Equity	Socioeconomic barriers limited device/internet access and consistent usage	Low to Moderate
Instructor Support	Minimal faculty involvement reduced impact; hybrid models showed better outcomes	Moderate
Self-Regulation	Apps helped track goals but lacked accuracy in self-assessment	Moderate
Safety & Technique	Lack of supervision risked poor form or injury during unsupervised use	Concerning
Academic vs Recreational Use	Many used apps more for fitness than structured academic learning	Weak Alignment
Curriculum Integration	Limited standardization and poor alignment reduced educational effectiveness	Weak

(Source: Self-Created)

Conclusions

This study strives to construct and evaluate the influence of mobile learning applications on college students' learning in physical education with the help of quantitative approaches. The study sets a clear objective within a feasible timeframe using a positivist philosophy, deductive reasoning, and quantitative approaches that will provide insight into skill acquisition, motivation, and theoretical instruction. Relying on combined survey data analyzed with SPSS, the results will be both comprehensive and credible. The results of this study will assist educators and developers as well as institutions in making decisions concerning the adoption of mobile technologies in PE.

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References

- Abduljawad, M. and Ahmad, A., 2023. An analysis of mobile learning (M-Learning) in education. *Multicultural Education*, 9(2), pp.145-152.
- Alonso-Fernández, D., Gutiérrez-Sánchez, Á., Portela-Pino, I. and Taboada-Iglesias, Y., 2022. Evaluation of applications for mobile devices on the practice of physical exercise in adolescents. *Applied Sciences*, 12(6), p.2784.
- Asare, S., Addae Kyenkyehene, S. and Kwadwo Emmanuel, M., 2023. Interactive technology in physical education classroom: A case of a Ghanaian college of education. *American Journal of Education and Information Technology*. <https://doi.org/10.11648/j.ajeit.20230702>
- Bracho-Amador, C.M., Granero-Gallegos, A., Baena-Extremera, A. and López-García, G.D., 2023. The effect of the motivational climate on satisfaction with physical education in secondary school education: mediation of teacher strategies in maintaining discipline. *Behavioral Sciences*, 13(2), p.178.
- Dey, B. and Kumar, R., 2024. Breaking barriers: The empowering effects of mobile e-learning for women in the digital age. In *Bharati International Journal of Multidisciplinary Research & Development (BIJMRD)* (Vol. 2, No. 5).
- Diekhoff, H. and Greve, S., 2023. Digital technology in game-based approaches: video tagging in football in PE. *Physical Education and Sport Pedagogy*, pp.1-13.
- Gil-Espinoza, F.J., Nielsen-Rodríguez, A., Romance, R. and Burgueño, R., 2022. Smartphone applications for physical activity promotion from physical education. *Education and Information Technologies*, 27(8), pp.11759-11779.



- Goodfellow, L.T., 2023. An overview of survey research. *Respiratory Care*, 68(9), pp.1309-1313.
- Möding, M., Woll, A. and Wagner, I., 2022. Video-based visual feedback to enhance motor learning in physical education—a systematic review. *German journal of exercise and sport research*, 52(3), pp.447-460.
- Qureshi, M.I., Khan, N., Raza, H., Imran, A. and Ismail, F., 2021. Digital technologies in education 4.0. Does it enhance the effectiveness of learning?
- Reports and data, 2022. Education Apps Market Size, Share, Trends, By Product Type (Web-Based and Mobile-Based), By End-Use (K-12 Education and Higher Education), By Operating System (IOS and MacOS and Android), and By Region Forecast to 2030. Available at: <https://www.reportsanddata.com/report-detail/education-apps-market>
- Song, X., 2024. Physical education teaching mode assisted by artificial intelligence assistant under the guidance of high-order complex network. *Scientific Reports*, 14(1), p.4104.
- Tsie, M.J., 2022. Exploring the use of mobile learning applications in the Physical Sciences classroom.
- Yahya, S.M.N.S., Jamaludin, K.A. and Mazalan, N.S., 2025. Systematic Mapping Review on Mobile Apps Integration in Physical Education: Implications for Health, Training, And Teacher Support. *African Journal of Biomedical Research*, 28(1), pp.40-54.
- Zhou, T., Wu, X., Wang, Y., Wang, Y. and Zhang, S., 2024. Application of artificial intelligence in physical education: a systematic review. *Education and Information Technologies*, 29(7), pp.8203-8220.
- Zulkifli, A.F. and Danis, A., 2022. Technology in physical education: Using movement analysis application to improve feedback on sports skills among undergraduate physical education students. *Social Sciences & Humanities Open*, 6(1), p.100350

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