Logía, educación física y deporte.
2025, 6(1), 63-71.
ISSN: 2695-9305.

Countering Pedagogical Sedentarism: The Flipped Learning Approach in Physical Education.

Contra el Sedentarismo Pedagógico: la apuesta del Flipped Learning en Educación Física.

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Abstract: In an educational context that demands innovative approaches, the flipped learning model stands out as an effective active methodology to address diversity, motivation, and meaningful learning. This article examines its application in Physical Education, highlighting how it enables the integration of theory and practice without reducing physical activity time. Based on a review of recent scientific literature and empirical studies, improvements are identified in academic performance, student autonomy, and the development of soft skills such as resilience, communication, and teamwork. Key aspects such as continuous feedback, the format of pre-class materials, and students' perceptions are also analyzed. Concrete examples of implementation aligned with the current curriculum are included. In conclusion, the flipped learning in Physical Education is not only feasible but also a recommended strategy to transform teaching into more inclusive, active, and contextually relevant learning experiences for the challenges of the 21st century.

Key Words: Flipped Learning; Physical Education; Active Learning; Educational Innovation; Active Methodologies

Resumen: En un escenario educativo que demanda propuestas innovadoras, el modelo de clase invertida se posiciona como una metodología activa eficaz para abordar la diversidad, la motivación y el aprendizaje significativo. Este artículo examina su aplicación en Educación Física, destacando cómo permite integrar teoría y práctica sin reducir el tiempo motor. A partir de una revisión de literatura científica reciente y estudios empíricos, se identifican mejoras en el rendimiento académico, la autonomía y el desarrollo de competencias blandas como la resiliencia, la comunicación y el trabajo en equipo. Asimismo, se analizan factores clave como la retroalimentación continua, el formato de los contenidos previos y la percepción del alumnado. Se incluyen ejemplos concretos de implementación alineados con el currículo. En conclusión, el aula invertida en Educación Física no solo es viable, sino una estrategia recomendable para transformar la enseñanza en experiencias inclusivas, activas y conectadas con los retos del siglo XXI.

Palabras clave: Aula invertida; Educación Física; Aprendizaje activo; Innovación educativa; Metodologías activas

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Recibido: 21/07/2025 | Aceptado: 12/09/2025 | Publicado: 16/09/2025

Introduction

In a world in constant transformation, where advances in medicine, communication, architecture, and technology have reshaped daily life, education continues to face the challenge of reinventing itself. Despite the accelerated changes of our time, many classrooms still maintain traditional dynamics that have changed little in decades: students sitting in rows, teachers explaining at the board, and content delivered in a one-way flow. This still-common image contrasts with the urgent need to rethink teaching to adapt it to an increasingly digital, diverse, and student-centered environment. Over the past decades, the gradual incorporation of Information and Communication Technologies (ICT) has driven the transformation of educational systems. It is no longer just about using digital tools, but about reshaping methodologies and redefining the roles of teachers and learners. Within this framework, the concept of *Flipped Classroom* emerged as a pioneering approach to reverse the traditional sequence of teaching, initially introduced by Bergmann and Sams (2012) and further conceptualized by Bishop and Verleger (2013). Over time, the model has evolved into what is now more broadly known as *Flipped Learning* (FL), emphasizing not only the use of videos but also a comprehensive pedagogical redesign that integrates content preparation, active classroom engagement, and continuous feedback (Bosch-Farré et al., 2024; Santiago & Bergmann, 2021).

The core idea of FL lies in reversing the traditional teaching sequence. Instead of using class time for lecturing and assigning homework for practice, students first engage with foundational content outside the classroom (via videos, readings, interactive presentations, or other formats), and in-class sessions are devoted to clarifying doubts, applying knowledge, collaborating with peers, and receiving personalized feedback. As a result, the classroom becomes an active learning space, where students deepen understanding, reflect, interact, and practice. A growing body of research shows that this approach not only improves academic performance but also enhances student motivation, autonomy, and engagement (Gilboy et al., 2015; Gómez-García et al., 2019; Han & Røkenes, 2020; López-Urán et al., 2022). Recent empirical studies further support these findings, showing that FL environments foster deeper learning outcomes, greater student resilience, and improved emotional involvement (Chen & Hsu, 2022; Ferriz-Valero et al., 2022; Thai et al., 2020). By freeing up time for tasks of higher cognitive and social value, FL supports meaningful learning and contributes to a richer, more contextualized educational experience.

While most FL studies have focused on higher education, interest in its application to secondary education and vocational training has increased in recent years (Campos-Gutiérrez et al., 2021; Ismaniati et al., 2023). In these settings, the model has proven effective not only for conceptual learning but also for fostering the development of transversal competencies such as responsibility, collaboration, resilience, and perceived competence. These skills, recognized by international organizations such as the OECD and UNESCO, are essential for developing critical, autonomous citizens equipped for an ever-changing labor market. One of the most influential factors in the success of the model is **feedback**. Continuous and constructive teacher feedback can enhance students' intrinsic motivation, prevent disengagement, and improve academic outcomes (Hattie & Timperley, 2007; Santiago & Bergmann, 2021). Another key, yet less explored, element is the **format of the theoretical content**. Although video is the most common format in FL, it is worth asking whether written materials could be equally or even more effective in certain contexts. Some studies suggest that reading on paper improves comprehension and retention compared to digital video, particularly for students used to taking notes or those with attention difficulties (James, 2017; Mueller & Oppenheimer, 2014). This issue becomes even more relevant when considering individual differences, the digital divide, and technological accessibility.

Based on these considerations, this article aims to offer a rigorous yet accessible overview of the benefits of the flipped model in **PE** a subject especially sensitive to the challenge of combining theory, practice, and motivation. Far from fitting into a traditional classroom mold, PE demands methodologies that foster student participation, promote autonomous learning, and maximize time spent on real physical activity. Throughout the article, we will explore the foundations of FL, its specific application to Physical Education (PE), and the most relevant scientific evidence regarding its impact. Additionally, we will reflect on students' perceptions and the main challenges teachers face when implementing this methodology, all from a science-based but reader-friendly perspective aimed at the broader educational community.

The Flipped Model: Theoretical Foundations

The FL model has earned a prominent place in the landscape of educational innovation. Although it is often associated with simply watching videos at home, its scope extends far beyond that. It is a methodology that fully reorganizes the teaching and learning sequence: theoretical content is introduced outside the classroom, through accessible resources such as videos, readings, or interactive activities, while in-class time is dedicated to hands-on application, problem-solving, collaborative work, and teacher guidance. This approach is not intended to merely "reinforce" previously seen content, but to **transform the classroom into a space for critical thinking, creativity, and analysis**. Rather than centering the session on content delivery, it promotes the development of higher-order cognitive skills, in line with **Bloom's Taxonomy**: foundational knowledge is accessed at home, and the classroom becomes a setting for applying, analyzing, evaluating, and creating.

The origins of FL date back to the early 2000s, when secondary school teachers Jonathan Bergmann and Aaron Sams began recording their lessons so absent students could view them at home. What started as a practical solution to address student diversity quickly evolved into a transformative teaching model: by removing traditional lectures from classroom time, they made room for **more personalized, engaging, and meaningful learning** (Bergmann & Sams, 2012). Since then, the model has developed considerably. It no longer revolves around videos alone. FL now integrates **a variety of pre-class resources** (such as texts, self-correcting quizzes, or digital simulations) and combines with **active learning strategies** like project-based learning, case studies, Socratic dialogue, and role-playing. According to the updated definition of FL by Santiago & Bergmann (2021), successful implementation of this model requires meeting several conditions: carefully designing the pre-class materials, fostering student responsibility in preparing the theoretical content, and using in-class time **exclusively for active and applied learning tasks**. While this structure is not rigid or prescriptive, it does demand thorough planning, clearly defined objectives, and continuous review of its pedagogical impact.

The model's growth in recent years is driven by multiple factors. On one hand, **technological progress** has made digital content and educational platforms more accessible. On the other, **shifts in educational culture** have increased demand for student-centered, active, and personalized methodologies. Moreover, **research support has been crucial**: numerous studies and meta-analyses report improvements in academic performance, motivation, active engagement time, and soft skills such as resilience, autonomy, and collaboration (Gómez-García et al., 2019; Moreno-Guerrero et al., 2024). From a theoretical perspective, FL is grounded in constructivism. This framework views learning not as the passive reception of information, but as an active process of constructing knowledge through experience, interaction, and reflection. In physical education specifically, recent syntheses confirm that constructivist-based flipped models enhance student motivation, engagement, and learning outcomes (Ferriz-Valero et al., 2022; Østerlie, 2023). By studying at home and applying knowledge in class, students become central agents of their

progress, while teachers act as facilitators in shared spaces of inquiry and collaboration (Killian & Woods, 2021).

Another key foundation is the cognitive reorganization advocated by Bloom's taxonomy. Traditionally, classroom time focused on remembering and understanding, while analysis or creative tasks were left as homework. FL reverses this logic: simple tasks are tackled independently, while complex, higher-order learning activities are scaffolded by the teacher. This reallocation of cognitive load has been shown to improve comprehension, foster critical thinking, and allow more inclusive participation in PE contexts (Ferriz-Valero et al., 2022; Østerlie, 2023). Far from being a passing trend, FL represents a **coherent evolution** toward more equitable, motivating, and digitally aligned educational models. Its adaptability across educational levels, from primary to higher education and vocational training, its methodological versatility, and its solid theoretical grounding make it a **powerful tool for redesigning education with a learner-centered approach**.

Flipped model implementation in physical education

Physical education has traditionally been associated with action, movement, and bodily experience due to its predominantly practical nature. However, current curricular frameworks have expanded its scope to include conceptual and attitudinal components that require deeper understanding. In this context, the **FL** model offers an ideal pedagogical strategy for balancing theory and practice without compromising physical activity time in the classroom. Its implementation allows students to acquire theoretical knowledge in advance, freeing up in-class sessions for more active, cooperative, and meaningful tasks.

Implementation phases of the flipped model in PE

The general structure of FL in PE follows a three-phase sequence:

- Pre-class preparation (individual space): The teacher provides theoretical content through short videos, visual readings, or interactive resources. These materials should be accessible, concise, and designed to foster autonomous understanding.
- Face-to-face session (group space): Once students have acquired conceptual knowledge, they arrive in class ready to put it into practice. Activities include practical tasks, challenge-based learning, circuit training, simulations, role-playing, or cooperative work. The teacher adopts the role of facilitator, offering continuous feedback and promoting critical reflection.
- Follow-up and feedback: Formative assessment tools such as rubrics, observation, self-assessment, or review quizzes are employed to consolidate learning and identify difficulties. Feedback varies depending on the content, delivery method, frequency, format, and timing.

This structure allows for better responsiveness to classroom diversity, adapting the pace and level of challenge to students' individual needs. It also increases effective physical activity time, a key factor in achieving the goals of motor competence and health promotion in PE.

Practical examples in didactic units

A concrete example can be found in a secondary school unit on orienteering. Teachers may design a set of videos on compass use, map interpretation, and basic rules. After acquiring this knowledge at home, students take part in outdoor sessions where they apply those concepts to complete routes, locate checkpoints, or solve real navigation challenges. Another applicable case

is a first aid unit. Instead of spending entire sessions explaining the survival chain or recovery position, teachers can prepare audiovisual materials with demonstrations and explanations. Class time is then used for hands-on practice with mannequins, dramatizations, or cooperative simulations. This not only increases practice time but also allows for more meaningful and realistic learning (Ferriz-Valero et al., 2025).

Curricular alignment and versatility

The flipped model aligns well with the current PE curriculum, addressing cognitive content without diminishing the physical dimension. Its versatility allows for integration with other active learning approaches such as cooperative learning, pedagogical models, or game-based instruction. For instance, Bores-García et al. (2021) demonstrated that combining FL with cooperative learning significantly enhances student motivation and classroom climate, promoting more inclusive and responsible participation.

Impact on learning

Numerous studies have shown that FL in PE promotes meaningful learning, autonomy, and self-regulation (Ryan & Deci, 2017). Furthermore, the ability to access content anytime and review it as needed reduces anxiety and improves understanding, especially among students with lower verbal skills or those requiring additional support. In this way, the FL model supports equity in knowledge access and fosters inclusion. FL enables educators to reconcile the demand for theoretical content coverage with the need to maximize motor engagement. It creates more opportunities to personalize instruction, encourage collaboration, and develop transversal competencies such as responsibility, reflection, and decision-making. As Ferriz-Valero et al. (2022) point out, FL is not a pedagogical trend, but a tested, versatile, and transformative methodology for 21st-century PE.

The strengths of flipped learning: beyond methodological change

The FL model represents far more than a reorganization of educational time and space. When applied with planning, guidance, and a solid pedagogical foundation, its benefits extend deeply: improved academic performance, increased intrinsic motivation, and better preparation for professional life (Sanchez-Gil-Machín et al., 2025). Among its many strengths, FL excels at fostering soft skills, which are increasingly valued by educators and employers alike. Feedback is a key component of the model. In FL environments, the teacher moves from being a mere content transmitter to a guide and facilitator. Recent studies (Arias, 2023; Barbero, 2024; Bosch-Farré et al., 2024) suggest that continuous feedback positively influences resilience, perceived competence, communication skills, and teamwork. This supportive structure enables students to feel more capable of facing challenges while strengthening their sense of competence and social interaction.

Resilience is enhanced by the safety provided in environments where students can make mistakes, adjust, and progress with the support of teachers and peers. Similarly, Chen & Hsu (2022) and Zhang et al. (2023) concluded that teacher support in FL improves students' readiness to overcome academic difficulties, creating a secure environment for experimentation. FL also significantly enhances perceived competence and self-confidence. Students can prepare at their own pace, revisit materials as needed, and receive timely, personalized feedback, factors that increase their belief in their capabilities. Ryan & Deci (2019) directly linked perceived competence to academic success. Studies by Sánchez-De Miguel et al. (2023), Zhang et al. (2023) and Zhou (2023), similarly show that FL reduces emotional barriers and reinforces students' self-efficacy.

Another key strength lies in the development of communication skills. By prioritizing active and cooperative tasks during class, FL fosters oral language development, argumentation, active listening, and assertive communication. Opportunities to ask questions, explain concepts to peers, and make group decisions lead to more meaningful interactions. Research by Chou & Zou (2020), Santos, Ferrer & Jiménez (2023) and Thai et al. (2020), confirm that peer-teacher exchanges enhance both academic understanding and social interaction. Finally, FL supports teamwork, a crucial skill in both educational and professional contexts. The collaborative nature of flipped activities requires coordination, planning, and mutual support. Studies by Esmaeili et al. (2020), Nourinezhad et al. (2021), and Turan & Akdag-Cimen (2020) report that such experiences foster cooperation, leadership, and shared problem-solving.

While FL's academic impact is well-documented, its link to employability is becoming increasingly evident. Soft skills are essential for successful job integration, as highlighted by the OECD, UNESCO, and studies such as Fernández-Rio et al. (2023) and Ferriz-Valero et al. (2024). Students exposed to FL with continuous feedback show better preparation for modern work environments, characterized by adaptability, problem-solving, and interprofessional collaboration. Santos, Ferrer & Jiménez (2023) further note that students who acquire transversal skills through FL experience smoother professional integration. In summary, FL enhances not only academic indicators but also personal and social skills vital for success inside and outside the classroom. Its capacity to blend autonomy with collaboration, individual reflection with shared feedback, and theoretical learning with practical experience makes it an educational approach aligned with 21st-century demands.

Student perception of the Flipped Learning in physical education

Understanding how students experience learning through the FL model in PE is essential to assess its pedagogical effectiveness. In recent years, several qualitative studies have investigated this topic, consistently reporting a generally positive perception and a high level of satisfaction with this approach. One of the most recurrent findings in the literature is the sense of autonomy and control students experience when they have early access to theoretical content. According to Østerlie and Kjelaas (2019), Norwegian adolescents expressed clear appreciation for the opportunity to prepare for practical sessions using explanatory videos accessible from home. This pre-class preparation, rather than being perceived as an additional burden, fostered a stronger sense of security and motivation upon arriving to class. Similarly, Frew (2023), in a study conducted with secondary school students in a STEAM context, found that learners responded positively to the flipped structure, as it encouraged a more dynamic, participatory, and emotionally engaging environment. The possibility of reviewing concepts prior to practical sessions helped enhance emotional involvement and the perceived relevance of the learning experience.

At the university level, the research by González-Calvo, Barba-Martín, and Bores-García (2021) explored the experience of Sports Science students during a biomechanics unit taught using the FL model. Qualitative data revealed improvements in group climate, cooperative work, and emotional engagement, emphasizing the importance of the active role assumed by students during in-person classes. In a longitudinal study, Pablo-Lerchundi et al. (2023) examined student perception in a teacher training program in PE across eight consecutive years of FL implementation. The findings point to a progressive enhancement in students' views over time, indicating that future teachers increasingly valued the model's benefits in terms of conceptual clarity, pre-class preparation, and practical application during lessons. Collectively, these studies highlight several key advantages of the flipped model from the students' perspective: greater autonomy, improved readiness for practical lessons, increased intrinsic motivation, more active

learning, a positive classroom climate, and more collaborative experiences. Furthermore, the data suggest that student perception improves significantly when instructors are experienced with the model and apply it consistently and systematically.

Conclusion

Within an increasingly demanding and diverse educational landscape, the FL model has emerged as a methodological alternative with strong transformative potential. Its implementation in PE is not only feasible but particularly timely and effective, as it allows for a more logical and pedagogically coherent reorganization of time, space, and resources. This article has argued that PE, far from being an exclusively practical subject, also encompasses conceptual, attitudinal, and procedural content that requires reflection, understanding, and knowledge transfer. The flipped model addresses this need by enabling students to acquire theoretical knowledge at home through accessible, comprehensible, and contextually relevant resources. Classroom time can then be devoted to active practice, experimentation, and competency development. The growing body of scientific evidence supports this approach. Recent studies report improvements in academic performance, increased intrinsic motivation, greater student engagement, and more efficient use of motor practice time. In PE, where experiential learning, autonomy, and commitment are essential, FL not only fits well but also amplifies the positive outcomes of instruction.

Among the most valued aspects of this model by students is its structural clarity: understanding what is expected of them, when, and how. This clarity reduces anxiety and confusion, promoting more organized and effective study habits. The ability to review materials at their own pace (pausing, rewinding, highlighting, or rewatching) enhances individualization, supports deeper understanding, and ensures that all students enter the classroom with a shared baseline upon which collaborative learning can be built. From a teaching perspective, the FL model facilitates more meaningful observation of the learning process. By reducing frontal instruction time, teachers can focus on addressing doubts, adjusting tasks, offering real-time feedback, and providing personalized guidance. This closer, more human interaction between teacher and student strengthens the classroom climate and improves the overall quality of the learning experience. The model also enables the seamless integration of active methodologies, such as project-based learning, cooperative work, Socratic dialogue, case studies, and gamification.

These strategies contribute to meeting students' basic psychological needs, increasing intrinsic motivation, and reducing demotivation (Sotos-Martínez et al., 2024). In this sense, FL becomes an ideal ally, as classroom time transforms into a space for creativity, interaction, and the resolution of real-world problems. In summary, applying the FL model to PE offers a well-founded and transformative pedagogical response. It supports diverse student needs, fosters meaningful learning, and promotes the development of both academic and socio-emotional competencies. Its true value lies not only in the reordering of instructional time, but in the profound shift it brings to educational dynamics, placing students at the center of the learning process. Compared to traditional approaches, often ill-suited to modern educational challenges, FL offers a rigorous, inclusive, and forward-thinking alternative aligned with a more critical, committed, and human-centered education.

Agradecimientos

Este trabajo se enmarca dentro de la tesis doctoral de Ricardo Sánchez-Gil Machín, dirigida en la Universidad de Alicante, cuyo objetivo general es analizar el impacto del Flipped Learning en Educación Física sobre la motivación, el rendimiento académico y el desarrollo de competencias transversales.

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