THE IMPACT OF DIGITAL TECHNOLOGY ON HEALTH, PHYSICAL EDUCATION AND PHYSICAL ACTIVITY

L'IMPATTO DELLA TECNOLOGIA DIGITALE SULLA SALUTE, L'EDUCAZIONE FISICA E L'ATTIVITÀ FISICA

Ferdinando Cereda
Università Cattolica del Sacro Cuore di Milano (The Catholic University of the Sacred Heart in Milan)
ferdinando.cereda@unicatt.it
https://orcid.org/0000-0002-3120-0684/

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ABSTRACT
Digital media is an integral part of young people's daily lives, with positive attributes but also associated risks. It is important to address digital media use in a pedagogical manner, as schools are responsible for adequately preparing students for life in a mediatized world. Media education can be included as part of traditional subjects. However, while science-oriented research openly meets this challenge, discussions regarding physical education tend to focus on the lack of exercise.

I media digitali sono una parte integrante della vita dei giovani, con aspetti positivi ma anche dei rischi associati. È importante affrontare l'uso dei media digitali pedagogicamente, poiché le scuole devono preparare bene gli studenti per la vita in un mondo mediatico. L'educazione ai media potrebbe essere inclusa come parte delle materie tradizionali. Mentre la scienza incontra questa sfida, le discussioni riguardanti l'educazione fisica si concentrano sulla mancanza di esercizio.

KEYWORDS
Digital media, physical education, physical activity, teachers, digital competence.
Media digitali, educazione fisica, attività fisica, insegnanti, competenza digitale.

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Introduction

Scientific research and cultural debate in Western countries have long been engaged with education, which has always been a universal problem. The term "education" etymologically derives from the Latin "educere," meaning to draw out, lead out, and, by extension, to nurture. This suggests the idea of education as a maieutic process, opposed to the transmissive idea that views humans as places of resources and talents to be brought out, accompanied to full maturity, and drawn out. Pedagogy as a scientific discipline belongs to the field of humanities, which are theories that concern human beings in the totality of their manifestations. It deals with social facts and assumes that human beings necessarily live in situations of reciprocal relationships, including educational relationships that intentionally produce teaching-learning processes.

According to Premoli (2022, p.23), pedagogy not only seeks to understand the educational event but also aims to make something happen and constructs knowledge and education as practical knowledge that guides professional practice.

Since 2001, Rivoltella (2001) noted that suspicion has always characterized the relationship between education and new media. However, the focus should not be on defending oneself, but rather on understanding the specific nature of "new" media and how they fit into the broader ecology of other media. Anyone involved in an educational event, regardless of their role, is fully immersed in a materiality that engages their senses, body, emotions, thoughts, spaces, times, rituals, affections, objects, materials, technologies, and tools. Therefore, while the educational relationship is certainly part of this materiality, it cannot exist without all the elements that constitute it.

So, pedagogy is a multi-faceted concept that has been defined in various ways (Dron, 2012). However, in the field of physical education (PE) and sport pedagogy, it is widely recognized that pedagogy involves the interconnection of three dimensions: (i) the learners and their learning, (ii) the teachers and their teaching, and (iii) knowledge in context (Armour, 2011; Quennerstedt, Gibbs, Almqvist, Nilsson, & Winther, 2016). According to Armour (2011), it is crucial to understand that all three dimensions of pedagogy are present and interacting in any pedagogical encounter between a teacher or coach and a young learner. In this framework, the learners-learning dimension focuses on supporting diverse children and young people to learn effectively, while the teachers-teaching dimension positions teachers as lifelong learners who continuously reflect on their capabilities

to meet the needs of young learners. The knowledge-context dimension refers to the value placed on what is taught or learned, and the contextual factors involved.

The utilization of digital technology (DT) for educational support has experienced an exponential increase in recent years. As a result, numerous subject areas and disciplinary perspectives have engaged in critical scrutiny of this phenomenon. Within this context, it has been argued that a critically informed perspective of DT in education is particularly crucial given the prevalence of impassioned and enthusiastic discourse surrounding it. The PE community has also participated in these debates, with Gard (2014), Lupton (2015), and Williamson (2015) posing new questions in this discursive space. By drawing upon contemporary literature on this topic, it is possible to reconsider the connections between pedagogy, technology, and education. Specifically, while recognizing the power and importance of the predominantly negative and alarmist views that have prevailed in academic literature thus far, there is an alternative perspective that examines the value of a pedagogically driven approach to using DT in PE to support young people's learning in the digital age.

1. Digital technology in physical education

The everyday lives of children and youth are permeated by digital media. While the technologies may change, their general interpretation follows a similar pattern, including educational innovations or even revolutions, as highlighted by Kerres (2022). However, digital media is associated with both opportunities and risks, such as insufficient physical activity or addiction, as pointed out by Kerres (2022). Given that these cannot be completely avoided, a pedagogical approach is required to deal with them effectively. Additionally, schools have the responsibility of adequately preparing students for life in present and future society, which now includes a deeply mediatized world, as argued by Couldry and Hepp (2013). Furthermore, the conditions of schools can be either inhibitory or beneficial, as found in the research of Gerick, Eickelmann, and Labusch (2018).

The current discourse about schools and teaching is dominated by the topic of digital media and how to effectively address it. As digital media is not typically taught as a standalone subject, it must be integrated into traditional subjects, which can offer advantages such as increased motivation among students across subjects (Engen, Giaever, & Mifsud, 2018). While science-oriented research tends to approach this challenge openly, discussions regarding PE have largely focused on topics such as lack of exercise, with digital technology being connected to this issue. Given its unique position as an esthetic subject that emphasizes physicality, PE plays

a particular role in these discussions. In addition to its original objectives, such as promoting health and an active lifestyle or teaching sports-specific skills, PE must also address topics related to media education (Greve, Thumel, Jastrow, Krieger, & Süßenbach, 2020).

The handling of digital media in PE is a complex issue due to the varying didactic designs of PE worldwide. There has been a diversity of international research on topics such as health, gamification, wearable technologies, and cooperative learning with digital media. While some authors have highlighted the possibilities and opportunities of digital media in PE, others have raised criticisms. For instance, van Hilvoorde and Koekoek (2018) pointed out that the omnipresence of digital technology in society can undermine the goals of PE in many ways, although they also acknowledged the new possibilities that emerge from new technologies, such as virtual or augmented reality.

Incorporating digital media in PE has led to discussions about the potential benefits and drawbacks of this approach. Despite the availability of new technologies that offer new possibilities for movement behavior and social interactions, researchers have also noted that the omnipresence of digital technology can undermine the goals of PE. As such, there is a need to carefully plan the use of digital media in a pedagogically sound manner. However, incorporating digital media into PE may be challenging, particularly in terms of user behavior and the potential disruptions to classroom activities.

The domains of physical, cognitive, social, and affective learning are common themes in language sport pedagogy, just as they are internationally. Educational goals and content are outlined in curricula and educational plans, while the individual student as a self-forming subject is the focus. While teachers can design the learning environment and support the learning process, it is up to the student to complete the learning process as a self-forming individual subject. Kirk (2012) emphasized the importance of approaching learning in a coherent manner across the physical, cognitive, social, and affective domains in order to promote a physically active lifestyle. These domains are considered the legitimate learning outcomes of PE, and will serve as the categories for reviewing studies in this paper.

This succinct literature review could provide a valuable contribution to empirical research in the field of education, given the contemporary relevance of the topic and the wide range of facets related to the utilization of digital media in PE and media pedagogic goals within academic institutions. The research analyzed in this paper employed diverse methodologies to investigate the objectives and

ramifications of digital media in PE, with particular emphasis on the physical elements of PE, as expounded by Kirk (2012) and Gerick et al. (2018).

2. Outcomes

Under this category, the studies analyzed the correlation between the utilization of digital media in PE and the physical activity level of students, as well as the impact on their motor skills or fitness. A mixed picture between possibilities and limitations emerged from the highly heterogeneous research methods. The following section presents studies involving low physical activity, which revealed a variety of results

Studies examining the effects of mobile apps on physical activity in primary school PE found that it was not effective in improving physical activity and psychosocial beliefs in elementary school children in the short term (Lee, 2018; Reynolds et al., 2018). Sedentary behavior increased in some studies when using digital media, while light exercise behavior decreased. However, light physical activity increased in comparison classes without digital media (Lee & Gao, 2020). Unlike light movement, intensive movement increased in these studies (Gao et al., 2017; Lee, 2018). Zhu and Dragon (2016) found only a small influence on the increase in physical activity. Similarly, Huang and Gao (2013) were unable to detect any increase in physical activity when using an exer-dance game. On the other hand, Wadsworth et al. (2014) found that the group playing adapted tennis without digital media took significantly more steps than those in an exergame. Primary school students reported liking lessons with exergames more but felt that they were moving less than usual (Shewmake et al., 2015). Additionally, Sun (2012) showed that an exergaming unit in a primary school did not meet the criteria for moderate physical activity, unlike the fitness unit used as a comparison.

In contrast to some studies that have reported limited effectiveness of exergaming on physical activity levels among children, a follow-up study conducted in a secondary school setting found that children exercised more during the exergaming unit than during traditional PE classes (Sun, 2013). This finding is supported by several other studies that have documented an increase in light to heavy physical activity levels resulting from technology-enhanced physical activity interventions (Fogel et al., 2010; Gao et al., 2017; Lonsdale et al., 2017; Lwin & Malik, 2012). Furthermore, a qualitative study by Hansen and Sanders (2010) reported that active play in PE can foster a voluntary desire to engage in and persist with technology-

enhanced physical activity among children. The case study by Sargent and Casey (2019) revealed that flipped learning (FL) in conjunction with digital media optimized teaching time and allowed for more physical activity, according to the teachers' perspective.

Interestingly, the comparison of studies conducted in primary schools versus those in secondary schools revealed some slight tendencies. The former generally found no improvement or even a negative influence on physical activity levels, whereas the latter mostly showed a positive trend. However, due to the limited number of studies available, no definitive conclusions can be drawn.

Studies have investigated the effects of using digital media in PE on motor capabilities and skills. While Kok et al., (2020) and Rincker & Misner (2017) found no significant improvement or deterioration in motor skills using digital media, Sheehan & Katz (2012), showed that the use of exergames in PE resulted in a significant improvement in balancing capabilities compared to a control group. A quantitative study found that learning gymnastics exercises with video feedback resulted in a significant improvement in motor skills (Potdevin et al., 2018), while another study showed improvement in motor skill learning through video and verbal feedback (Nowels and Hewit, 2018). Mixed-methods research demonstrated that video and teacher feedback led to the most positive overall results and significant improvements in motor skills Palao et al. (2015). Moreover, dynamic videos were found to be more effective than images in enhancing game performance, and augmented reality was found to be more effective than normal videos in improving running style (Chang et al., 2020) Overall, the studies suggest that digital media use in PE can lead to an improvement in motor capabilities and skills.

Several studies have explored the impact of digital media on physical fitness in PE, with the aim of enhancing body-related performance parameters. Most of these studies indicated that the use of digital media can increase the fitness of students (Chen & Sun, 2017; Cheng & Chen, 2018; Nation-Grainger, 2017; Rincker & Misner, 2017; Ye et al., 2018), except for one study by Bendiksen et al. (2014). Ye et al. (2018) demonstrated that PE classes combined with exergaming had a positive effect on students' BMI and fitness in an intervention study, while Cheng and Chen (2018) found that traditional PE classes using apps to record fitness data led to a greater increase in fitness values. Chen and Sun (2017) showed that a 6-week program of active videogames was an effective strategy to improve children's cardiorespiratory fitness, while Nation-Grainger (2017) demonstrated that the use

of heart rate monitors and individual feedback increased calories burned and distance run.

Overall, all studies investigating the relationship between the use of digital media and physical fitness in PE showed positive outcomes. However, it is essential to consider and address data protection issues related to the use of digital media for acquiring physical fitness. Therefore, careful planning is necessary for its effective use.

3. Discussion

The examination revealed that distinct technologies have been employed in the various studies, which have undergone modifications over time and are expected to undergo further transformations in the future. Additionally, it became apparent that an investigation focusing not only on software and hardware, but also on a didactic perspective is warranted. This requirement is in line with Kerres' (2022) characterization of research on the employment of digital media in schools, including PE.

Furthermore, the comprehension of PE has an impact on the utilization of digital media in addition to its influence. Various investigations reveal diverse understandings of PE, (Prohl, 2006; Kirk, 2012). However, the majority of studies concentrate on physical fitness, activity, and the practical application of digital media. This emphasis in literature may be attributed to the use of digital media in professional sports, where video feedback has been utilized for an extended period in club sport settings. Owing to traditional perspectives on PE, this practice has frequently been adopted in schools, particularly in PE. Furthermore, this feedback mechanism can be an effective way to enhance sport-specific capabilities and skills.

When utilizing digital media as a tool for instruction, it is crucial for educators to consider the potential impact on students' self-image when viewing themselves. However, despite the significance of this matter, there have been limited studies examining the effects of self-image on student performance. Some studies have indicated that students may strive to present themselves favorably in videos, while others suggest that teachers may unconsciously create hierarchies based on physical appearance. Therefore, it is important for educators to reflect on these potential effects when incorporating digital media into their instruction, as they may have an impact beyond the scope of academic performance.

The incorporation of mutual filming and its associated new roles and tasks presents a promising opportunity to stimulate greater student interest in sport-specific subjects. A significant proportion of studies have focused on utilizing digital media as a functional means to achieve the learning objectives of PE, with an emphasis on learning with media. However, there have been relatively few studies that have specifically addressed issues surrounding media education, including questions of data protection and legal aspects. While interventions involving digital media, including those that do not involve PE, have generally not raised concerns among students regarding issues such as data protection related to smartwatch use, there has been a notable lack of effort in setting goals pertaining to digital media use in PE that incorporate opportunities for children to learn about media. This may be attributed to the perception that digital media is primarily a tool for enhancing performance and activity.

According to Marttinen et al. (2019), the utilization of digital media as a tool for teaching and learning in PE has not yet reached its full potential. Despite its increasing prevalence, the empirical context has yet to shed light on the didactic perspective of digital media use in PE. As a result, a gap between the use of technology in PE and the didactics supporting it becomes apparent. The curriculum outlines the objectives and content for digital media use, but the student is ultimately responsible for their own education as an individual subject. In this regard, the teacher may employ digital media to design the learning environment and facilitate the learning process, but the student must act as a self-forming individual subject to complete the learning process (Gröben & Prohl, 2012; Prohl, 2006).

The utilization of digital media offers a distinct advantage in enhancing the self-educational process among students, thereby contributing to the educational and didactic goals of PE. A review of relevant literature supports the assertion that the ubiquitous nature of digital media in students' daily lives serves to increase motivation towards learning. Moreover, the potential of digital media to adapt learning materials and content in PE has been highlighted. While the impact of digital media on physical activity has yielded mixed results, it is nevertheless recommended that digital media be used to integrate non-participating students into PE classes or to promote self-regulatory learning through self-assessment. These findings have been previously discussed by Goodyear and colleagues (2014) and O'Loughlin and colleagues (2013).

Moreover, the use of digital media has been found to establish a link between the media environment within and outside of educational institutions, and has

demonstrated efficacy as a motivational tool to enhance engagement, interest, and satisfaction. Nevertheless, the integration of exergames in PE curriculum demands considerable effort in terms of preparation, and entails significant financial costs associated with the acquisition of necessary equipment, which constitutes a major impediment to its implementation. In this regard, students have also identified the weight and bulkiness of the equipment, as well as its inaccessibility outside the classroom, as significant obstacles (Marttinen et al., 2019).

Conclusions

By referencing Veletsianos' (2016) argument that a focus on "emerging technologies" and "emerging practices" in digital learning may offer a fruitful path forward. According to Veletsianos, these concepts are not bound by disciplinary boundaries and are shaped by the environments in which they operate. Additionally, the potential for change exists within emerging technologies, but has not yet been realized. The key takeaway of this paper is that DigiTech has the ability to impact multiple sectors and contexts, and can be utilized in various ways to enhance learning experiences. Adopting a pessimistic view of DT's role in health and PE would be a disservice to young learners. As Veletsianos suggests, DT is not yet fully integrated into education, presenting an opportunity for experts to shape discourse, practice, and pedagogy around DTin PE rather than allowing technology experts to dominate the field.

The utilization of digital media in Physical Education (PE) has been found to offer various benefits, such as enhancing sport-specific motor capabilities and skills and motivating students. However, the literature has demonstrated that there are barriers to the effective use of digital media in PE, particularly related to the inadequate preparation of PE teachers. Therefore, for successful implementation, it is crucial to provide better training and preparation for teachers, since the impact of digital media in PE largely depends on the presentation in an appropriate form and additional instructions provided by the teacher (Østerlie & Mehus, 2020; Roure et al., 2019). To achieve this, the primary focus should be on enhancing teacher preparation and training in terms of didactic, methodological, and media educational content, given that the tools used for digital media in PE will continue to evolve over time. Moreover, the reviewed studies have emphasized the importance of teachers utilizing digital media to think critically about media content (De Araújo, Knijnik, & Ovens, 2020) and being equipped with a reflective approach to the use of digital media (Bodsworth & Goodyear, 2017).

The comprehension of physical education (PE) holds significant sway over the application and purpose of digital media in the domain. Specifically, the inquiry

arises as to whether PE centers on developing sport-specific skills exclusively or encompasses broader educational goals. To address these concerns, it is imperative that preservice teachers receive training that extends beyond performance-based objectives in PE, during their academic preparation. Furthermore, the focus of extant research indicates a preponderance towards enhancing physical performance or activity, with limited exploration of alternative perspectives. Consequently, further investigation is necessary to gain additional insights into students' media experiences and learning in PE, which have not been adequately explored. This warrants a need to examine learning with and about media, along with the impact of digital technologies on the body and sports activities, in both research and educational settings, to satisfy educational requirements.

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