

Epistemic Cognitions and Teacher Development in Physical Education: Understanding How Teachers Integrate Physical and Digital Literacy in Practice

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ABSTRACT

Physical literacy has become a central concept guiding contemporary physical education (PE) curricula worldwide. In Malaysia, for example, when policy documents emphasise its holistic and lifelong orientation, less is known about how teachers understand and articulate physical literacy in practice, particularly within digitally mediated teaching contexts. This study examines Physical Education (PE) teachers' epistemic cognitions of physical literacy and the integration of digital learning in teaching. Using an Epistemic Judgement approach, semi-structured interviews were conducted among fourteen secondary school PE teachers to explore their understanding of digital technologies, perceived competence, and willingness to adapt to technological changes. The findings indicate that teachers conceptualise physical literacy as a holistic, lifelong construct encompassing not only movement competence but also motivation, confidence, health awareness, and social development. Teachers view digital learning as epistemically valuable when it supports understanding, reflection, and inclusivity, rather than merely enhancing efficiency or engagement. However, tensions emerge between teachers' epistemic ideals and structural constraints, including limited instructional time, inadequate facilities, uneven access to technology, and persistent perceptions of Physical Education as a less academically significant subject. These constraints shape teachers' professional judgement and influence how epistemic goals are enacted in practice. Implications are discussed for teacher development, suggesting a shift from technical training toward epistemic professional learning that supports teachers' reasoning, judgement, and reflective decision-making in complex classroom contexts.

Keywords: Epistemic Cognitions, Teacher Development, Physical Education, Physical Literacy, Digital Literacy

INTRODUCTION

Physical Education (PE) is essential to students' holistic growth, helping them develop physical fitness alongside emotional, social, and cognitive dimensions, as stated in Malaysia's curriculum framework. Over the last few years, the professional scope of PE teachers has expanded beyond conventional movement education to more digitalized and technology-based approaches, especially after COVID-19. Schools have become increasingly concerned with students' health and wellbeing, and have started fostering physical literacy, which incorporates the motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life. This concept has been widely accepted as a core element of global education policy (Whitehead, 2020). Physical literacy has emerged as a foundational framework for promoting lifelong physical activity and overall quality of life. Despite its policy prominence, many PE teachers struggle to translate physical literacy concepts into daily practice due to insufficient professional training and curriculum

guidelines (Wainwright et al., 2021). Transnational analyses across contexts like England, Cyprus, Egypt, and China reveal substantial variations in how PE teachers conceptually understand physical literacy, with many still conflating it with traditional fitness metrics or competitive sport performance rather than a holistic developmental construct.

In Malaysia, this conceptual translation is further complicated by the contemporary mandate to integrate digital literacy as a transformative pedagogical tool. Rather than treating technology as a replacement for physical activity, modern Malaysian PE teachers are expected to use digital tools as pedagogical supports. However, successful integration is heavily dictated by teachers' epistemic cognitions, their underlying beliefs about the nature of knowledge and how teaching and learning should occur in a physically active space. This paper examines PE teachers' epistemic cognitions and practice-oriented understandings of both physical and digital literacy in Malaysia. By investigating key dimensions such as philosophy-to-practice alignment, self-efficacy, and willingness to change, this study highlights how teachers' beliefs shape their roles in fostering student well-being.

LITERATURE REVIEW

Conventional physical education has relied on a teacher-led model emphasizing sports skills, physical fitness, and competition. Delivered in structured settings like gymnasiums and playing fields, this approach focuses almost exclusively on physical conditioning and standardized movement (Luguterah, 2026). Over the years, Physical Education (PE) has undergone significant pedagogical development, shaped by changing educational philosophies, learner needs, and societal expectations. The field has progressively moved beyond traditional, teacher-centred and performance-oriented approaches toward more learner-centred, holistic, inclusive, and competency-based models of teaching and learning. Even educational organizations and researchers have emphasized that physical literacy should be afforded educational importance comparable to traditional forms of literacy and numeracy (Tremblay, 2012; Delaney et al., 2008). Although physical literacy has gained increasing attention, with numerous governments, organizations, and research groups promoting initiatives and interventions to enhance it, there remains considerable variation in how the concept is defined and conceptualized across different contexts.

The development of teachers' professional knowledge increasingly extends beyond the acquisition of subject-specific skills. Within this review, physical literacy and digital literacy are considered as important dimensions of PE teachers' professional knowledge and development. Both forms of literacy involve not only the acquisition of knowledge and skills but also the ability to critically engage with, interpret, and apply knowledge in practice. In this regard, they are closely associated with epistemic cognition, as teachers continually make judgments about the sources, credibility, relevance, and applicability of knowledge when making professional and pedagogical decisions. Examining physical and digital literacy through the lens of epistemic cognition may therefore provide deeper insight into how teachers construct and evaluate knowledge and how these processes contribute to their ongoing professional development.

Physical literacy is defined as motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for engagement in physical activities for life (Whitehead, 2013). This multidimensional construct aligns well with the holistic aims of sustainable development by fostering individuals who are not only physically competent but also empowered to make informed choices about their health and well-being, and to act responsibly within their environments. Integrating physical literacy into PE curricula therefore presents an opportunity to reconceptualize physical education as a key driver of sustainable development, one that nurtures physically active, health-conscious, and environmentally responsible global citizens (Godbout, 2023).

Physical and Digital Literacy in Physical Education

Physical literacy has evolved to mean different things to different people in different contexts. This conceptual evolution highlights its multifaceted nature, transcending health, education, and sport sectors (Durden-Myers & Bartle, 2023). Physical literacy, broadly defined as the motivation, confidence, physical competence, knowledge,

and understanding to value and take responsibility for engagement in physical activities for life (Whitehead, 2013), has gained increasing attention in educational and health contexts. PE teachers play a pivotal role in fostering physical literacy, as they are the primary facilitators of movement skills and physical activity within schools (Edwards et al., 2017). Their understanding of physical literacy influences how they design and implement curricula, which can directly impact students' physical activity behaviours and lifelong engagement. Several studies have explored PE teachers' conceptualizations of physical literacy. Cairney et al. (2019) reported that practitioners interpret the concept differently, often shaped by their training background and experience in physical education. Some teachers emphasize physical competence while others highlight motivational or cognitive aspects, suggesting a multidimensional understanding is essential for effectively promoting physical literacy (Keegan et al., 2019). The World Health Organization's Global Action Plan on Physical Activity (GAPPA) 2018–2030 highlights physical literacy (PL) as an important means of reducing sedentary behaviour and promoting better health outcomes (WHO, 2018). Similarly, UNESCO's Quality Physical Education (QPE) guidelines identify PL as an important foundation for inclusive and developmentally appropriate physical education (UNESCO, 2015).

Although physical literacy (PL) is widely recognised as a holistic and inclusive educational goal, its successful implementation in schools depends largely on teachers' ability to translate its principles into everyday practice. Therefore, well-structured and effective teacher training is essential to support teachers in integrating PL into their teaching (Valle-Muñoz et al., 2025).

Definitions of digital literacy are numerous in education literature. Scholars generally agree that digital literacy extends beyond technical skills to include cognitive and pedagogical dimensions. It is a multifaceted concept, with different scholars highlighting different aspects of digital literacy. For instance, digital tools can also enhance teaching and support teachers in creating more engaging and effective learning experiences. Recent studies have identified practical digital tools that can support physical activity in PE. For example, Gil-Espinosa et al. (2022) identified 18 smartphone applications that teachers can use to effectively promote physical activity among students.

Similarly, positive effects on physical activity through digital media in PE were confirmed by Villasana et al. (2020) and Goodyear et al. (2019b), which teachers can use to effectively promote physical activity among students, though it remains unclear which specific types of digital media are most effective for this purpose.

Emphasizing the teacher's role, Hadjerrouit (2010) proposed a theoretical framework for developing digital literacy (DL) in schools by equipping teachers with the skills to design and critically evaluate digital learning resources. The framework highlights the pedagogical usability (which concerns how effectively resources support learning) and cultural usability (which considers students' preferences) that influence the process of learning. Hadjerrouit (2010) emphasises the importance of integrating digital literacy (DL) across the curriculum to enhance meaningful learning. This approach can support teachers in adopting more constructivist and learner-centred practices, using digital tools to promote active student engagement in the learning process.

Epistemic Cognition in Physical Education

Epistemology is a branch of philosophy that examines the nature, sources, and limits of knowledge. It addresses fundamental questions about what knowledge is, how it is acquired, and how we determine what we know or do not know. Epistemology is important because it shapes how individuals understand information, form judgments, and make decisions (Grecic, 2015).

In the context of Physical Education (PE), epistemology is particularly relevant to understanding how teachers perceive, evaluate, and apply knowledge in their teaching practices. PE teachers draw on different forms of knowledge, including theoretical, pedagogical, practical, and technological knowledge, when planning and delivering lessons. Their beliefs about what constitutes valuable knowledge and how knowledge should be acquired may influence how they understand and implement physical literacy (PL) and digital literacy (DL). Thus,

examining teachers' epistemic beliefs provides insight into why teachers may interpret and implement PL and DL differently in practice.

Numerous studies have demonstrated a close relationship between teachers' beliefs, their classroom practices, and the learning environments they create (Hofer, 2002; Kagan, 1992; Nespor, 1987). For instance, in teaching Physical Education (PE), Tsangaridou (2006) highlights the challenge of defining knowledge and its role in delivering high-quality PE. Knowledge can be understood in different ways, leading to varying views of the knowledge and competencies required by PE teachers (McEvoy et al., 2015; Waring & Herold, 2019). This perspective is important because it considers not only the knowledge teachers need for effective practice but also the knowledge they develop through their teaching experiences.

Therefore, epistemic cognition can help teachers develop a deeper understanding of the complex relationship between fitness, health, and physical activity, enabling them to apply their cognitive and practical knowledge more holistically.

METHODOLOGY

This study adopted a qualitative research design to explore the lived experiences, perceptions, and professional understandings of Physical Education (PE) teachers regarding the implementation of physical literacy. Data were collected through semi-structured interviews, using an Epistemic Judgement framework grounded in a Critical Realist perspective. This approach allowed a deep look at how teachers' core beliefs, mindsets, and working conditions shape how they teach physical education and make Physical Education classroom decisions.

The study used a purposive sampling technique to select fourteen (n=14) secondary school PE teachers in Malaysia. The sample comprised five female and nine male teachers representing a diverse range of teaching experience, professional roles, and school environments. This could provide detailed insights into how teachers translate policy mandates into daily teaching practice.

Data were gathered through semi-structured interviews using a protocol structured around five core questions, followed by target topics and diagnostic probes. Each section of the interview schedule was mapped to theoretical socialisation constructs and epistemic cognitive dimensions:

Question 1: Captures teacher background, qualifications, roles, continuous professional development (CPD), and teaching philosophy. Epistemically, this section targets teachers' aims, uncovering their core drives, passions, true beliefs, and personal values.

Question 2: Current Role Experience and Network Dynamics: Evaluates teacher role satisfaction or frustration across five core operational domains: curriculum, learning environment, pedagogy, management support, and assessment.

Question 3: Desired Pedagogical Changes: Explores teachers' willingness to adapt and implement changes across curriculum design, learning environments, and assessment methods. Epistemically, this maps to teachers' ideals, the standards and benchmarks they use to judge pedagogical effectiveness.

Question 4: Conceptions and Integration of Physical Literacy (PL): Examines how teachers define, operationalize, and evaluate PL within the curriculum. Epistemically, this focuses on reliable processes in understanding how teachers assess the validity, credibility, and practical applicability of physical literacy concepts.

Question 5: Adoption and Realities of Digital Learning (DL): Evaluates the pedagogical rationale behind technology integration, personal self-efficacy, and resources.

To show how the interview data created the two epistemic orientations, the analysis used inductive-deductive thematic coding. First, the analysis coded the transcripts line by line to identify teachers' views on physical literacy, digital tool use, assessment, and teaching challenges. Second, similar codes were grouped into categories based on common ideas, such as efficiency, measurement, student motivation, inclusion, and engagement. Third, these categories were later combined into broader themes representing teachers' epistemic orientations towards digital pedagogical integration. Finally, the themes were mapped onto the conceptual framework to examine how teachers' beliefs, contextual barriers, and classroom practices are connected.

FINDINGS AND DISCUSSION

The findings are based on the following thematic analysis.

Conceptions of Physical Literacy

Across all participants, physical literacy is understood as a holistic, lifelong construct that extends far beyond mere physical competence or athletic skills. It encompasses motivation, confidence, knowledge, understanding, attitudes, and values that support lifelong engagement in physical activity. Teachers consistently distinguish physical literacy from competitive sport performance, which means that when sports focus on competition, physical literacy is viewed as inclusive teaching and learning that enables all students to participate meaningfully.

Teachers position Physical Education as the primary institutional platform for nurturing physical literacy because it offers structured exposure to diverse movements, games, and health education. One participant articulated this lifelong orientation:

"Physical literacy is not just about skills, but the motivation, confidence, and understanding that allow students to be active throughout life."

Another teacher emphasized:

"It's about students continuing to exercise even outside school hours, not only during PE lessons."

The core building blocks of this construct are identified as fundamental movement skills (FMS), such as balance, coordination, running, jumping, throwing, and strength. Crucially, teachers view physical literacy as the cognitive and physical foundation that underpins self-efficacy and active participation:

"If students master basic movements, they feel confident to join games and competitions."

Teachers also strongly link physical literacy to whole-person development (including emotional resilience, social skills, and teamwork) and health promotion, framing it as a preventive tool against rising societal obesity rates and sedentary lifestyles.

Tracing Interview Evidence to Epistemic Orientations

A central objective of this study is to demonstrate how qualitative interview evidence led to the identification of two functional Epistemic Orientations.

Table 1 provides the detailed Qualitative Coding Matrix, mapping initial representative codes and sub-categories to supporting interview quotations and overarching epistemic themes.

When translating educational beliefs into digital practice, teachers navigate two distinct epistemic processes or approaches:

Table 1. Qualitative Coding Matrix: Tracing Interview Evidence to Epistemic Orientations

Epistemic Orientation (Theme)	Categories & Focus	Representative Initial Codes	Supporting Interview Quotations
1. Performance & Assessment Alignment Orientation	Skill Acquisition & Visual Modeling Focus: Movement accuracy, fundamental motor skills, technique refinement.	-Visual movement demonstration -Pre-practice clarity -Technique error reduction	<i>"Videos help students understand the movement clearly before they practice. When they already know what to do, the lesson runs more effectively."</i>
1. Performance & Assessment Alignment Orientation (cont.)	Systematic & Objective Assessment Focus: Physiological tracking, standardized fitness metrics, grading accountability.	-Objective fitness tracking -Digital SEGAK /BMI logging - Reducing manual grading error	<i>"Using pedometers and fitness apps makes assessment more systematic and accurate compared to manual recording."</i>
1. Performance & Assessment Alignment Orientation (cont.)	Instructional Efficiency Focus: Optimizing field time, streamlining teacher explanations.	- Time optimization - Direct instruction extension - Functional technology utility	<i>"Using short clips allowed me to spend less time explaining on the court and more time engaging students in active movement practice."</i>
2. Pedagogical Engagement & Inclusivity Orientation	Holistic & Lifelong Movement Focus: Non-competitive engagement, affective development, lifelong physical habits.	- Lifelong movement habits - Motivation and confidence - Non-competitive participation	<i>"Physical literacy is not just about skills, but the motivation, confidence, and understanding that allow students to be active throughout life."</i> <i>"It's about students continuing to exercise even outside school hours."</i>
2. Pedagogical Engagement & Inclusivity Orientation (cont.)	Interactive Engagement & Gamification Focus: Student-centred motivation, lower	- Interactive quiz platforms - Gamified learning (Kahoot/Quizizz)	<i>"When I use videos and online quizzes, students are more interested and participate better... It creates a friendly, fun environment for everyone."</i>

	movement anxiety, diverse learning preferences.	- Lowering movement anxiety	
2. Pedagogical Engagement & Inclusivity Orientation (cont.)	Pedagogical Flexibility & Continuity Focus: Learning continuity beyond outdoor limits, reflective learning platforms.	- Weather contingency teaching - Asynchronous learning - Reflective spaces (Padlet/LMS)	<i>"...especially when outdoor lessons cannot be done due to bad weather. I can use platforms like Quizizz and Google Forms to keep them connected."</i>

As shown in the qualitative matrix above, teachers with a Performance and Assessment Alignment Orientation see technology as a tool that improves teaching and assessment. Teachers value digital tools to improve physical skills, save lesson time, and increase assessment accuracy during national SEGAK fitness testing.

In contrast, teachers with a Pedagogical Engagement and Inclusivity Orientation focus more on students' emotional and cognitive needs. They use tools such as Kahoot, Quizizz, Padlet, and Google Classroom to increase student engagement, reduce anxiety among less athletic students, and support learning when PE activities are affected by bad weather.

Table 2 summarizes the two orientations by linking each one to the teachers' main teaching beliefs and the digital tools they commonly use.

Table 2. Epistemic Orientations and Associated Digital Implementations in PE

Epistemic Orientation	Core Pedagogical Beliefs	Typical Digital Implementations
Performance & Assessment Alignment Orientation	- Physical competence underpins motivation. - Objective tracking drives student accountability. - Instructional efficiency maximizes active movement time.	- Technique/movement demonstration videos (YouTube) - Wearable fitness trackers (smartwatches, pedometers) - Digital fitness logs & BMI/SEGAK tracking apps
Pedagogical Engagement & Inclusivity Orientation	- Holistic development requires student interest & confidence. - Accessibility and continuity foster lifelong activity habits. - Interactive platforms accommodate diverse learning styles.	- Gamified quiz platforms (Kahoot, Quizizz) - Collaborative reflection platforms (Padlet) - Learning Management Systems (Google Classroom) - Asynchronous digital video resources

The table presents two main epistemic orientations among PE teachers and shows how their pedagogical beliefs are reflected in their use of digital technologies. The Performance and Assessment Orientation focuses on physical competence, accountability, and teaching efficiency, using tools such as movement videos, wearable devices, and digital fitness records. In contrast, the Inclusivity and Engagement Orientation emphasises holistic development, accessibility, student interest, and diverse learning needs, supported by tools such as Kahoot, Quizizz, Padlet, Google Classroom, and asynchronous video resources.

Teacher Self-Efficacy and Confidence in Technology Use

The findings show that teachers' self-efficacy depends on the context and the support available to them. Many teachers feel confident using basic digital tools for teaching and administrative tasks. However, their confidence decreases when they are required to integrate digital technology more deeply into their teaching. For example,

"I can use basic platforms like Quizizz and Google Forms, but I'm not fully confident to integrate technology deeply in every lesson."

This lack of confidence is not due to a lack of interest, but is mainly due to limited training, insufficient technical support, and institutional barriers that affect teaching effectiveness. Even teachers who are willing to use more advanced technology report that their confidence decreases when adequate institutional support is not available. As mentioned by a teacher:

"We are willing to use more advanced applications, but the facilities and equipment are not always available."

This means teachers understand and are mentally prepared to use technology in their teaching, but they do not always have the resources, support, time, or suitable environment to do so effectively.

Pedagogical Adaptability and Willingness to Change

Although PE teachers face various challenges in their teaching environment, they remain willing to change and adapt their teaching methods. They are open to trying new approaches that better support students' needs, learning, and health.

Teachers strongly believe that PE must evolve to match the current technology and cognitive preferences of new-generation students. There is a collective consensus that traditional teaching styles (such as using mahjong paper) are no longer relevant and disengage students' interest. For examples,

"Students prefer interactive digital learning. We need to adapt to their world."

"Even though there are limitations, I still try to use digital tools because it helps students understand better."

Teachers emphasize the need to embrace technology and move beyond textbook-based teaching. They also suggested improving the outdated curriculum and modernizing nationwide fitness assessments such as SEGAK (National Physical Fitness Standard for Malaysian School Pupils) by transitioning them into custom mobile applications to drive instructional efficiency and student motivation.

The findings of this study provide a practical understanding of how Malaysian Physical Education (PE) teachers address both physical literacy (PL) and digital literacy (DL). Using the concept of epistemic cognition, the study goes beyond simply examining whether teachers use technology in the classroom; instead, it explores how teachers' beliefs, confidence in using technology, and school environments influence the delivery of 21st-century PE. For teacher educators and professional development (PD) designers, these findings offer a clear roadmap for reforming teacher preparation to support holistic, digitally integrated student wellness

A significant contribution of this study is the identification of two functional Epistemic orientations through which PE teachers translate their educational beliefs into practice. First is the Performance-and- Assessment Alignment Approach, where PE knowledge is rooted in physical competence, fundamental motor skills (FMS), and objective physiological progress. In this context, digital tools facilitate the practical implementation of physical education instruction by enabling video-based performance analysis, wearable activity tracking, and streamlined national fitness assessments. Here, technology is valued for making tasks more efficient and improving performance.

The second one is the Pedagogical Engagement-and-Inclusivity approach. This approach is based on a student-centred philosophy that focuses on motivation, confidence, social interaction, and lifelong well-being. Teachers use digital tools such as Quizizz, Kahoot, Padlet, and Google Classroom to support interactive, reflective, and continuous learning beyond the PE field. Technology is valued for its potential to provide flexible, interactive, and engaging teaching and to increase access for all students.

Implications For Teacher Education

Teacher education programmes and staff training shouldn't force a choice between digital and physical skills. Instead, it should show how tech and movement work together to create well-rounded learning. Together, they can support the multidimensional development of physical literacy (encompassing physical, cognitive, affective, and social domains), which upholds the National Philosophy of Education, and prepare teachers to respond to the changing needs of the contemporary Physical Education subject in Malaysia.

So, professional development initiatives should utilize these identified processes by offering tailored pedagogical integration tracks.

For teachers aligned with the Performance and Assessment approach, training should focus on using digital and wearable tech skills to boost student movement and assessment accuracy.

For teachers aligned with the Engagement and Inclusivity approach, training should emphasize interactive games and collaborative media, as those digital tools can lower anxiety and build movement confidence among less athletically inclined students.

To make these tracks successful, school leadership must give physical education equal priority in school IT budget and resource allocation by ensuring PE teachers receive the same support as any other academic subject.

CONCLUSION

This study demonstrates that PE teachers' integration of digital learning is fundamentally governed by their underlying epistemic cognitions. This paper illustrates how empirical interview evidence maps to two distinct epistemic orientations. They recognise the increasingly digital nature of students' everyday experiences and adapt their teaching accordingly by replacing traditional materials with interactive digital strategies. Therefore, successful digital PE relies on teacher training that bridges the gap between educational goals and the practical limits of the school environment.

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REFERENCES

1. Audrin, C., & Audrin, B. (2022). Key factors in digital literacy in learning and education: A systematic literature review using text mining. **Education and Information Technologies*, 27*(6), 7395–7419.
2. Delaney, B., Donnelly, P., News, J., & Haughey, T. J. (2008). Improving physical literacy. *Sport Northern Ireland*.
3. Edwards, L.C., Bryant, A.S., Keegan, R.J. et al. Definitions, Foundations and Associations of Physical Literacy: A Systematic Review. *Sports Med* 47, 113–126 (2017). <https://doi.org/10.1007/s40279-016-0560-7>
4. Gil-Espinosa, F. J., Nielsen-Rodríguez, A., Romance, R., & Martínez-Olmo, F. (2022). Smartphone applications for physical activity promotion from physical education. **Education and Information Technologies*, 27*, 11759–11779. <https://doi.org/10.1007/s10639-022-11001-3>
5. Godbout P. Emergence of physical literacy in physical education: some curricular repercussions. *Phys Educ Sport Pedagog*. 2023;28(5):503–16. <https://doi.org/10.1080/17408989.2021.2004109>.
6. Gómez-García, G., Marín-Marín, J. A., & Romero-Rodríguez, J.-M. (2020). Effect of the flipped classroom and gamification methods in the development of a didactic unit on healthy habits and diet in primary education. **Nutrients*, 12*(7), 2210. <https://doi.org/10.3390/nu12072210>
7. Goodyear, V. A., Kerner, C., & Quennerstedt, M. (2019). Young people's uses of wearable healthy lifestyle technologies: Surveillance, self-surveillance, and resistance. **Sport, Education and Society*, 24*(3), 212–225. <https://doi.org/10.1080/13573322.2017.1375907>
8. Grecic, D. (2025). The Epistemic Judgement Chain to Support Holistic Physical Education Teacher Development-An Initial Study. *Research in Physical Education, Sport and Health*, 13(2), 49-56.
9. Grecic, D., and Palmer, C. (2021). The CARE curriculum in physical education and sport: A guide to pupil and athlete development. Preston: Sport and Wellbeing Press.
10. Grecic, D., Sprake, A., Thomson, A., Christodoulides, E., & Palmer, C. (2024). The epistemic judgement framework: A reflexive tool for physical education teachers' professional development to support quality physical education. *Frontiers in Education*, 9, Article 1480690. <https://doi.org/10.3389/feduc.2024.1480690>
11. Hofer, B. K. (2002). Epistemological world views of teachers: From beliefs to practice. *Issues in Education*, 8(2), 167–74.
12. Kagan, D. M. (1992). Implications of Research on Teacher Belief. *Educational Psychologist*, 27, 65–90.
13. Knoke, C., Woll, A. & Wagner, I. Health promotion through digital media in physical education: a qualitative interview study on student experiences and acceptance. *Ger J Exerc Sport Res* (2026). <https://doi.org/10.1007/s12662-026-01133-5>
14. Luguterah, A.W. Integration of physical literacy into physical education (PE) curricula to align with the United Nations Sustainable Development Goals (SDGs). *Discov Sustain* 7, 547 (2026). <https://doi.org/10.1007/s43621-026-02719-7>
15. Nespor, J. (1987). The role of beliefs in the practice of teaching. *Journal of Curriculum Studies*, 19(4), 317-328.
16. Tremblay, M. S. (2012). Major initiatives related to childhood obesity and physical inactivity in Canada: The year in review. *Canadian Journal of Public Health*, 103(3), 164–169. <https://doi.org/10.1007/BF03403806>
17. UNESCO (2015). Quality physical education. Paris: UNESCO.
18. UNESCO (2023b). Quality Physical Education Guidelines for Policy Makers. Available online at: <https://unesdoc.unesco.org/ark:/48223/pf0000231101>
19. Valle-Muñoz, V. M., Mendoza-Muñoz, M., & Villa-González, E. (2025). Physical Literacy as a Pedagogical Model in Physical Education. *Children*, 12(8), 1008. <https://doi.org/10.3390/children12081008>

20. Villasana, M. V., Pires, I. M., Sá, J., Garcia, N. M., Teixeira, M. C., Zdravevski, E., Chorbev, I., & Lameski, P. (2020). Promotion of healthy lifestyles to teenagers with mobile devices: A case study in Portugal. **Healthcare*, 8*(3), 315. <https://doi.org/10.3390/healthcare8030315>
21. Whitehead M. (2013). Definition of physical literacy and clarification of related. *ICSSPE Bull J Sport Sci Phys Educ*.
22. Whitehead, M. (2010). *Physical literacy throughout the life-course*. London: Routledge.
23. Whitehead, M. E., Durden-Myers, E. J., and Pot, N. (2018). The value of fostering physical literacy. *J. Teach. Phys. Educ.* 37, 252–261. doi: 10.1123/jtpe.2018-0139
24. WHO (2018). *Global Action Plan on Physical Activity 2018–2030: More active people for a healthier world*. Geneva: World Health Organization