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Teacher Professional Development in Higher Education: Applying Digital Technologies to Optimize Student-Centered Teaching Strategies

Desarrollo profesional docente en el ámbito universitario: aplicación de tecnologías digitales para optimizar estrategias de enseñanza centradas en el estudiante

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Resumen

En los programas de formación de entrenadores (PFE), especialmente en el ámbito universitario, se observa una tendencia creciente hacia enfoques pedagógicos centrados en el estudiante, impulsada además por el auge de modalidades en línea como respuesta a los avances tecnológicos del siglo XXI. Sin embargo, persisten vacíos en la literatura respecto al uso de las tecnologías de la información y la comunicación digitales (TICD) como medio para fomentar este enfoque formativo. En este contexto, se propone un marco para la enseñanza centrada en el estudiante (ECE) junto con lineamientos para una integración coherente de las TICD, y se presentan estrategias orientadas a su aplicación efectiva en los PFE universitarios. Entre las propuestas clave se encuentran: capacitar a los docentes en ECE y uso pedagógico de TICD; diseñar entornos virtuales con retroalimentación activa; promover la autonomía del estudiante-entrenador en la selección tecnológica; considerar sus conocimientos previos; diversificar las herramientas tecnológicas disponibles; fomentar la colaboración a través de plataformas digitales; y evaluar continuamente la eficacia de estas herramientas ante las necesidades formativas emergentes. Para lograr una transformación educativa significativa, es esencial que el profesorado comprenda los principios de la ECE integrados en el uso de TICD, de modo que se creen entornos de aprendizaje flexibles, colaborativos y verdaderamente centrados en el estudiante.

Palabras clave: Formación docente; Tecnologías digitales; Enseñanza centrada en el estudiante; Aprendizaje en línea.

Abstract

In coach education programmes (CEP), particularly in the university setting, there is a growing trend towards student-centred pedagogical approaches, further driven by the rise of online modalities in response to 21st-century technological advances. However, gaps remain in the literature regarding the use of digital information and communication technologies (DICT) as a means to foster this educational approach. In this context, a framework for student-centred education (SCE) is proposed, along with guidelines for a coherent integration of DICT, presenting strategies aimed at their effective application in university-based CEP. Key proposals include: training educators in SCE and the pedagogical use of DICT; designing virtual environments with active feedback; promoting the autonomy of student-coaches in technology selection; considering their prior knowledge; diversifying the technological tools available; fostering collaboration through digital platforms; and continuously assessing the effectiveness of these tools in addressing emerging educational needs. To achieve meaningful educational transformation, it is essential that educators understand the principles of SCE embedded in the use of DICT, thereby creating flexible, collaborative, and truly student-centred learning environments.

Keywords: Teacher Training; Digital Technologies; Student-Centered Learning; Online Learning.

1. Introduction

In parallel with the drive towards the professionalisation of sport coaching, the number of coach education programmes (CEPs) offered within the university sector has increased across several countries (ICCE, 2016). In the UK, for instance, the number of university-based CEPs rose from 245 in 2009 to 466 in 2019 Dray et al. (2019). However, many coaches have perceived these programmes as having limited impact on their development López et al. (2017) Morgan et al. (2013) Turner et al. (2009). This perception is largely attributed to the predominance of traditional, teacher- or instructor-centred approaches. Such methods often overlook student-coaches' prior knowledge and tend to provide learning experiences that are disconnected from real-world professional practice Trudel et al. (2020).

Research has demonstrated that adopting a learner-centred teaching (LCT) approach can make university-based coach education programmes (CEPs) more meaningful for participating coaches Salles (2019) Trudel et al. (2020). The LCT is grounded in constructivist learning theory and, as Weimer (2013, p.15) explains:

Research has demonstrated that adopting a learner-centred teaching (LCT) approach can make university-based coach education programmes (CEPs) more meaningful for participating coaches. The LCT is grounded in constructivist learning theory and, as Weimer (2013, p.15) explains, "is teaching focused on learning—what the students are doing is the central concern of the teacher. Being 'focused on learning' is easily understood at a superficial level, but its delineation reveals more details and intricacies: it is teaching that engages students in the hard, messy work of learning; it is teaching that motivates and empowers students by giving them some control over learning processes; it is teaching that encourages collaboration, acknowledging the classroom (be it virtual or real) as a community where everyone shares the learning agenda; it is teaching that promotes students' reflection about what they are learning and how they are learning it; it is teaching that includes explicit learning skills instruction."

Given its emphasis on individuality and context-specific learning experiences, learner-centred teaching (LCT) appears well positioned to address several of the core criticisms directed at coach education programmes (CEPs) Trudel et al. (2020). Research has identified a number of potential benefits associated with LCT, including the development of both individual and social learning skills, autonomy, and creativity (Galatti et al., 2019; Milistetd et al., 2019a). According to Mallett et al. (2013), critical and independent thinking skills, alongside a deep understanding of content, are essential competencies for effective coaching. The authors argue that university-based CEPs—particularly those designed for high-performance coaches—should offer collaborative opportunities (e.g., discussions) and incorporate authentic tasks and assessments (e.g., self- and peer evaluations) that can be directly applied within real coaching environments (e.g., training sessions). Indeed, the interactive and reflective strategies that characterise LCT have been positively received by coaches when implemented within university settings Ciampolini et al. (2019).

In the past decade, recommendations for coach education programmes (CEPs) have increasingly aligned with learner-centred teaching (LCT) approaches Paquette et al. (2018); Trudel et al. (2020), particularly through the application of Weimer's (2013) framework within university settings Milistetd et al. (2019b). When implementing Weimer's LCT framework in a university-based CEP, Milistetd et al. (2019a) and Salles (2019) observed that student-coaches were able to expand their understanding of coaching and begin to envision themselves in the coaching role. These findings underscore the value of active teaching strategies and the relevance of LCT in enhancing coach education within higher education contexts.

In response to the rapid technological evolution of the 21st century, research exploring learner-centred teaching (LCT) within online learning environments has become increasingly common Hanewicz et al. (2017); McCombs et al. (2005), paralleling the expanded use of Digital Information and Communication Technologies (DICT) in coach education programmes (CEPs) Dray et al. (2019); Stoszkowski et al. (2017). The International Council for Coaching Excellence (ICCE), acknowledging the growing significance of technology in education, advocates for its use to enhance the learning experiences of coaches, particularly within university contexts ICCE (2016). Strategic integration of DICT may even support high-performance coaches in achieving success at international levels Cifuentes et al. (2022). Nevertheless, scholarly work that explicitly examines the application of LCT principles in conjunction with DICT within coach education remains scarce Cushion et al. (2018).

Given this context, the objectives of this essay are: (a) to present the principles of Learner-Centred Teaching (LCT) and guidelines for integrating Digital Information and Communication Technologies (DICT) in alignment with this pedagogical approach; and (b) to explore and discuss proposals for the use of DICT that can facilitate a learner-centred approach in university-based coach education programmes. This essay will thus offer reflections on the implications of LCT and DICT, aiming to provide educators and coach developers with practical principles and strategies to be implemented within coach education programmes, thereby better equipping coaches for their professional roles.

Learner-Centered Teaching

Learner-Centered Psychological Principles

According to McCombs (1997), there are 14 principles that constitute a knowledge base rooted in a learner-centred perspective, organised into factors that are essential to the learning process, as they form the foundation for effective teaching practices (see Table 1). These principles inform decisions regarding content, the learning environment, and the opportunities provided for learning, defining a dynamic context for ongoing improvement. A fundamental concept is that educational systems must cater to the needs of all learners, be focused on the individual, and demonstrate a clear understanding of the learning process, along with the essential knowledge and skills that need to be developed.

Table 1. Learner-centered psychological principles.

COGNITIVE AND METACOGNITIVE FACTORS
Nature of the learning principles. The learning of a complex subject is most effective when it is an intentional process of constructing meaning from information and experience.
Goals of the learning process. The successful learner, over time and with support and instructional guidance, can create meaningful representations of knowledge.
Construction of knowledge. The successful learner can link new information with existing knowledge in meaningful ways.
Strategic thinking. The successful learner can create and use a repertoire of thinking and reasoning strategies to achieve complex learning goals.
Thinking about thinking. Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking.
Context of learning. Learning is influenced by environmental factors including culture, technology, and instructional practices. Teachers play an important role in interacting with the student and the learning environment.
MOTIVATIONAL AND AFFECTIVE FACTORS
Motivational and emotional influences on learning. What and how much is learned is influenced by motivation. Motivation to learn, in turn, is influenced by the individual's emotional states, beliefs, interests and goals, and habits of thinking.
Intrinsic motivation to learn. The learner's creativity, higher order thinking, and natural curiosity, contribute to motivation to learn. Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty, relevant to personal interests, and providing for personal choice and control.
Effects of motivation on effort. Acquisition of complex knowledge and skills requires extended learner effort and guided practice. Without learners' motivation to learn, the willingness to exert this effort is unlikely without coercion.
DEVELOPMENTAL AND SOCIAL FACTORS
Developmental influences on learning. There are different opportunities and constraints for learning. Learning is most effective when differential development within and across physical, intellectual, emotional, and social domains is considered.
Social influences on learning. Learning is influenced by social interactions, interpersonal relations, and communication with others.
INDIVIDUAL DIFFERENCES FACTORS
Individual differences in learning. Learners have different strategies, approaches, and capabilities for learning that are a function of prior experience and heredity.

Learning and diversity.	Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.
Standards and assessment.	Setting appropriately high and challenging standards and assessing the learner, as well as learning progress, are integral parts of the learning process.

Source: Authors, based on APA (1997).

Higher education institutions were urged to adopt learner-centred teaching (LCT) in the 21st century Blumberg (2009) Cullen et al. (2012); Weimer (2013), transitioning from the Instruction Paradigm, where both the teacher and the instruction are at the centre of education, to the Learning Paradigm Barr et al. (1995). Teaching within the Learning Paradigm is characterised by collaboration and cooperation between the teacher and the learner. In this model, the teacher is no longer solely responsible for planning, delivering, and assessing the content and strategies. Instead, these responsibilities are shared with the learner, thus making the teaching-learning process more meaningful and engaging for the student.

Dimensions of the Learner-Centered Teaching

To support this paradigm shift in higher education, educators and researchers have developed theoretical teaching approaches and tools for assessing the status of programmes or courses Cullen et al. (2012); Weimer (2013). Highlights the necessity of decentralising the role of the teacher in education, identifying five key dimensions that can guide the process of curricular reorganisation based on learner-centred teaching (LCT): the role of the teacher; the balance of power; the function of content; the responsibility for learning; and the purpose and processes of evaluation. Table 2 presents some challenges to consider, along with key changes and practical implications, in relation to these five dimensions when implementing LCT.

Table 2. Challenges, key changes and implications in practice regarding Weimer's five. dimensions.

	Challenges	Key changes	Implications
The Role of the Teacher	- Instructional action tend to be focused on teachers; - Teachers see themselves as a lecturer or provider of the knowledge to be transferred to the learners.	- Teacher is a facilitator of learning, responsible for stimulating learners' desire to learn and guide reflective learning from experience, and to develop structure, content and tools that value learning as a lifelong process; - Genuine trust in learners by the facilitator, followed by the creation of an accepting and empathic environment.	- When the teacher says less, learners can make more discoveries; - Development of intellectual maturity and learner' responsibility for learning itself.
The Balance of Power	- Teachers often exercise their control in the classroom by making all or most of the decisions related to learning; - Learners tend to feel comfortable with teachers' control, having experienced more authoritarian education systems in primary and secondary schools.	- The power is gradually shared, considering the autonomy of learners and the confidence of teachers; - Learners' opinions and recommendations are listened to, so teachers share decision- making about learning with learners; - Positive relationships, non-directivity, empathy, cordiality, and encouragement for thinking and learning.	- Teachers control less, learners are more involved; - Learners can feel confident, more open to challenges and motivated to learn.

The Function of Content	- Teachers often strive to teach as much content as possible, to fulfill curriculum requirements and help learners acquire as much knowledge as possible.	- Teachers consider the meaning of the content for the learner, instead of the amount of it; - Teachers help learners develop a knowledge base and learning skills that consider the learners' prior knowledge to assist in solving everyday problem situations.	- Teachers may cover less, but student can learn more; - Meaningful and continuous learning.
The Responsibility for Learning	- Contemporary students come to higher education less confident and with a high level of stress, often being unable to function without structure and imposed control, and with little or no commitment to learning.	- Teachers create a safe learning environment that motivate learners to accept gradually responsibility for learning.	- Development of intellectual maturity, learning skills, and awareness; - Giving learners the opportunity to become independent learners is a necessity, and support may be needed for the development of autonomy and self-direction in learning.
The Purpose and Processes of Evaluation	- The students' biggest concern is to get a good grade.	- Evaluation activities should also be used to promote learning and to develop self- and peer assessment skills.	- Accurate self- and peer assessment results in fewer arguments over grades; - It does not eliminate grades or responsibilities. Rather, provides an opportunity for active learning.

Source: Authors, based on the work of (Blumberg, 2009; Cullen et al., 2012; Hanewicz et al., 2017; Weimer, 2013).

It is important to note that learning is a dynamic, non-linear, and lifelong process Jarvis (2009), meaning that learners can progress and regress, displaying varying levels of autonomy depending on the issue at hand Weimer (2013). Moreover, the development of autonomy and self-directed learning skills is not an automatic outcome of learner-centred teaching (LCT). Therefore, it is crucial that faculty employing these approaches do so in ways that effectively support students' growth and development as learners.

LCT and the Digital Information and Communication Technologies

With the advancement of technology and the rise of online education, it is essential to consider the implications of employing learner-centred teaching (LCT) within digital environments McCombs et al. (2005). Indeed, in both virtual and face-to-face settings, student engagement in higher education is closely linked to active learning Meyer (2014). In LCT environments, teachers must foster opportunities for discovery, thereby encouraging active learning Weimer (2013). McCombs (2005) outline several practical implications for educators, administrators, and researchers when integrating Digital Information and Communication Technologies (DICT) into teaching.

Concerning cognitive and metacognitive factors, McCombs et al. (2005) emphasise the importance of planning specific teaching strategies for the virtual environment to support metacognition and encourage students' reflection on the learning process. Examples of such strategies include the use of virtual platforms for dialogue and collaboration between learners, establishing an ongoing basis for problem-solving discussions, participation in projects, creation of digital content, development of methods to organise and synthesise information, and evaluation of learning outcomes. While oral exposure remains significant, especially for introducing new concepts Blumberg (2009); McQuade et al. (2015), this can be more challenging in virtual settings where distractions from various devices are more prevalent. Thus, interactive strategies must bridge students' prior knowledge with new content and technological tools, enhancing engagement and meaningful learning Weimer (2013). Additionally, promoting digital literacy and strategic thinking through appropriate and diverse electronic resources tailored to students' needs and capabilities is crucial McCombs et al. (2005).

Regarding motivational and affective factors, it is important to recognise that in online education programmes, learners are not always independent, self-disciplined, or self-reliant McCombs et al. (2005). In such contexts, the teacher can provide support through various channels, such as emails, chats, and online mentoring, as well as using Socratic questioning, continuous feedback, and guided practice to encourage learners to become more self-directed and motivated. Another crucial aspect of fostering motivation is offering opportunities for control and choice, such as allowing learners to select from a variety of activities, assessment methods, content for electronic portfolios, and the specific technologies to be used. This should be carried out in a supportive yet challenging environment, where learners feel accepted and encouraged to take risks McCombs et al. (2005).

Social and developmental factors involve establishing strategies that facilitate interaction and virtual communication between learners and the teacher, in order to reduce feelings of isolation and foster a sense of community McCombs et al. (2005). Two-way communication and feedback regarding learners' expectations for the course are essential in this process. When student-coaches receive ongoing feedback, they are more likely to take responsibility for their own learning Santos et al. (2023a); Santos et al. (2023b). Furthermore, collaboration among learners, which includes peer feedback, can be beneficial for mutual learning Carl et al. (2017). Finally, incorporating interactive activities allows learners to adopt new or non-traditional roles, with opportunities for dramatization and role-play to encourage dialogue and learning. Online games and videoconferencing, whether for individual or group discussions, can support this process by enabling learners to build teams, develop electronic personas, reduce anxiety, and encourage collaboration McCombs et al. (2005).

Finally, with regard to the factor of individual differences, McCombs et al. (2005) emphasise the importance of conducting diagnostic evaluations of learners' characteristics, behaviours, and skills to inform the planning and provision of various ways of electronically presenting materials to cater to different learner needs. Diverse strategies, such as texts, graphics, audio, video, or animations, enable learners to capitalise on the non-linear and personalised learning resources offered by virtual environments. Additionally, assessment methods can be diversified, along with the provision of feedback and online notes. The ability to offer contextualised and personalised feedback throughout the assessment process can enhance learner motivation and promote meaningful learning Santos et al. (2023a). When online teaching practices are tailored according to principles and practices validated by research, teachers are perceived as learner-centred McCombs (2015).

McCombs et al. (2005) argue that a fundamental structure for developing a virtual learning environment should include: (a) recognising the holistic nature of learning, encompassing the four domains identified in learner-centred principles; (b) implementing strategies that align the technological characteristics with the needs of learners within a non-linear and dynamic learning process; (c) fostering the development of relationships and communities of learners that support the idea of learning as a partnership among all participants; and (d) acknowledging that the roles of teacher and learner evolve dynamically as different levels of knowledge are acquired.

LCT' Five Dimensions and DICT: Propositions for University-based Coach Education

Learner-centred teaching has been advocated for coach education programmes (CEP) worldwide, aiming to provide opportunities for active learning Nelson et al. (2013), while also valuing the knowledge and experiences that coaches have accumulated throughout their careers Trudel et al. (2013). This approach is believed to contribute to the development of more effective programmes, including those offered by universities Milistetd et al. (2019a). Paquette and Trudel (2018b) proposed ten recommendations to support the implementation of learner-centred teaching in CEP, focusing on assisting coach development administrators with designing, facilitating, and engaging coach learners. These recommendations emphasised the importance of adapting to the objectives and needs of each context, which can be achieved through: (a) becoming a learner-centred leader; (b) employing a variety of learning strategies to meet specific outcomes; (c) deliberately fostering learning skills; (d) integrating assessment with learning; (e) recruiting facilitators rather than instructors; (f) providing learner-centred training for facilitators; (g) regularly assessing the facilitator's performance; (h) helping coaches recognise their learning vision and comprehend LCT; (i) prioritising the creation of meaningful content for coaches; and (j) empowering coaches with increased autonomy and learning choices.

However, the implications of using Digital Information and Communication Technologies (DICT) to support the feasibility of LCT in university settings are still rarely explored Cushion et al. (2018). Consequently, we propose seven suggestions, aligned with Weimer's (2013) five dimensions of LCT, that can serve as a guide to integrating DICT within a learner-centred approach for university-based CEPs (see Figure 2).

The Role of the Teacher

Proposition 1 - Empower Teachers in Terms of LCT Knowledge and DICT Ability

For technology to become an integral part of educational reform, teachers must possess a fundamental understanding of how to apply the principles of learner-centred teaching (LCT) when utilising digital information and communication technologies (DICT), as well as how to use them effectively.

Among the recommendations for coach development administrators is the provision of training for teachers in learning facilitation Paquette et al. (2018b), and the encouragement for them to assume the role of coach developers (Galatti et al. (2019). According to the ICCE (2014), coach developers are "those trained to develop, support and challenge coaches to go on honing and improving their knowledge and skills in order to provide positive and effective sport experiences for all participants" (p. 6). Given the complexity of facilitation, a first step in training for LCT involves reading and internalising the principles underpinning learner-centred teaching Paquette et al. (2018b). Adopting an LCT perspective requires a shift in teaching philosophy Milistetd et al., 2019b), and as such, training may present certain challenges. Culver et al. (2019) found that,

during a training process, the biography and prior knowledge of coach developers influenced their understanding of facilitation. While some were already familiar with LCT and felt at ease, others found it challenging, as LCT facilitation differed significantly from their accustomed teaching methods.

Another important aspect of training was the need, expressed by some coach developers, to observe a more experienced facilitator in action. Galatti et al. (2019) demonstrated that such observation supported the training process of a novice coach developer within a university-based CEP. Moreover, sharing personal experiences of facilitation and engaging in reflective dialogue with peers appeared to be essential for the professional development of facilitators. In both studies, familiarisation with LCT seemed to significantly enhance facilitators' performance in learner-centred programmes.

In line with Weimer's (2013) discussion on the non-linear nature of adopting a learner-centred approach, it is important to note that when teachers assume the role of coach developers as learning facilitators, this does not imply they should never provide instruction or guidance. On the contrary, there may be moments when direct instruction and the introduction of new knowledge are necessary to support the maturation of learning McQuade et al. (2015).

The ability to use Digital Information and Communication Technologies (DICT) effectively is essential for their successful integration within a learner-centred teaching (LCT) framework. However, factors such as the availability and accessibility of technologies, limited social interaction, and digital fatigue may hinder the effectiveness of this process Setiawan (2024). Teachers' competence and self-efficacy play a crucial role in developing a positive attitude towards instructional technologies and promoting their integration within the educational context Seifu (2020).

Proposition 2 - Provide a Supportive and Feedback-rich Environment using Different DICT

Being available via email, participating in forums, and engaging in virtual mentoring can foster positive relationships between teachers and student-coaches, while also enabling timely feedback and continuous learning.

Coach developers in CEP have been recognised for their potential to foster lifelong learning through three primary mechanisms Dohme et al. (2019). The first involves being available and accessible, offering ongoing support and inspiring coaches to continue refining and expanding their knowledge and skills beyond the conclusion of a CEP. The second mechanism relates to cultivating a sense of belonging; coach developers should facilitate a supportive environment that fosters positive and enduring relationships among programme participants.

The third mechanism aims to elevate coaches' aspirations by reinforcing their sense of purpose and responsibility. This is achieved by clearly communicating that coaches play a vital role in the holistic development of individuals, ultimately contributing to their well-being, competence, and lifelong skill acquisition. These multifaceted responsibilities require coach developers to be self-reflective and to demonstrate a comprehensive understanding of: (a) the context in which coach education takes place; (b) the coaches they are supporting; (c) theories of learning across different age groups; (d) the training curriculum; and (e) innovative educational practices Abraham et al. (2013).

The Balance of Power

Proposition 3 - Provide Opportunities for Control and Choice of DICT by Student-coaches

As student-coaches gain experience and take increased responsibility for their own learning, the structure of support and activities may gradually decrease. This progressive reduction in scaffolding serves to promote learner autonomy and accountability, aligning with the principle of balancing power between teacher and learner inherent in learner-centred teaching.

The literature in coach education indicates that rigid guidelines and limited opportunities for shared decision-making can reduce learner autonomy Paquette et al. (2014), subsequently affecting motivational and affective dimensions of learning APA (1997). Inflexible educational structures often foster the notion that there is a singular, correct way to train, thereby restricting reflection and personalisation in the coach's development journey Paquette et al. (2014). To address this, scholars recommend striking a careful balance between structure and flexibility in the design and implementation of coach education programmes Paquette et al. (2018b), while taking into account individual differences.

In line with these recommendations, McCombs et al. (2005) stress the importance of actively engaging learners in problem-solving, project participation, and dynamic activities. They highlight that interactivity is closely linked to learners' perceptions of a quality learning experience, and that offering choices—such as the type of activity—enhances engagement and autonomy. Within this context, digital technologies can play a significant role in facilitating a balanced distribution of power in coach education programmes by enabling interactive virtual environments that foster collaboration between educators and learners.

The Function of Content

Proposition 4 - Consider the Student-coaches' Previous Knowledge Regarding the Content of the Course and DICT

In an investigation of a bachelor's programme in Physical Education in Brazil, Milistetd et al. (2018) observed that teachers rarely assessed learners' prior knowledge related to course content. A noteworthy exception was reported by Galatti et al. (2019), where lecturers in a sports science undergraduate programme designed the curriculum of a specific module based on student-coaches' perceptions of the knowledge and skills relevant to coaching. As a result, the content was tailored to meet the specific learning needs of the cohort. Additionally, Milistetd et al. (2019a) employed various strategies—such as training observations and peer discussions—to support learners in creating meaningful connections between classroom topics and their day-to-day experiences as student-coaches.

When using Digital Information and Communication Technologies (DICT), it is crucial not only to assess learners' prior knowledge of academic content but also to consider their technological competencies and familiarity with virtual learning environments McCombs et al. (2005). Although today's students are often labelled as digital natives and are assumed to expect technology to be embedded in their education, their actual skills and preferences regarding DICT vary considerably Kennedy et al. (2008, 2010). Therefore, educators should avoid assuming uniform technological competence and instead promote digital literacy when needed. While some learners may have full access to digital tools and reliable internet connections, others may face significant barriers, including limited or no access to these resources.

Prior experiences with Digital Information and Communication Technologies (DICT) are closely linked to conditions of availability and accessibility. Among the limited number of empirical studies on the use of DICT in university-based Coach Education Programmes (CEP), Stoszkowski et al. (2017) highlighted that prior knowledge significantly influences collaborative problem-solving. Their study also revealed that students exhibited limited interest in learning how to navigate unfamiliar digital platforms. Similarly, Dray et al. (2019) caution that students often demonstrate lower levels of engagement with educational digital platforms compared to social media. Thus, despite the increasing presence of technology in society, some learners may face difficulties or may not actively participate in the educational process involving digital tools.

Moreover, while many students possess basic digital competencies—such as using email, virtual classrooms, and general applications—they often report feeling less confident when required to utilise digital tools for the analysis and resolution of real-world problems Perea (2022). In this context, it becomes essential to promote digital literacy that goes beyond basic functionality, by introducing learners to practical and relevant technological tools. Strengthening digital literacy in this way can enhance student-coaches' confidence and competence in employing DICT meaningfully within their educational and professional development.

Proposition 5 – Include Different Options for DICT in the Teaching-learning Process

The use of Digital Information and Communication Technologies (DICT) should serve to bridge the gap between prior knowledge and newly acquired understanding among student-coaches, both in terms of content and technological tools. It is important to recognise that what proves effective in one context may not necessarily yield the same results in another, just as individual learning preferences and needs can vary greatly. Therefore, offering a range of DICT tools enhances the likelihood of addressing diverse learning styles and supporting personalised learning pathways.

Jones et al. (2014) investigated the use of video diaries in university-based coach education, focusing on their potential to foster empowerment, active voice, spontaneity, and reflection as a learning strategy. Their findings revealed that coaches using video diaries tended to be less reflective than those who engaged in written reflections and group discussions. Conversely, Mead et al. (2016) demonstrated that video diaries can function effectively as self-assessment tools, particularly in the context of continuous learning among elite coaches, thus underscoring the importance of contextualised assessment. Accordingly, educators must consider a holistic range of cognitive, metacognitive, motivational, affective, social, and individual factors to ensure that the integration of technology contributes meaningfully to the learning experience McCombs (2005).

Teachers may employ both synchronous and asynchronous communication through technological resources in online education Almeida (2003). Asynchronous communication takes place without requiring participants to be present at the same time or in the same space, allowing for flexibility and self-paced engagement. In contrast, synchronous communication occurs in real time, requiring participants to be present simultaneously in a shared virtual environment Moreira (2020). Combining synchronous and asynchronous methods can accommodate diverse learner needs and circumstances, thereby enhancing the attainment of learning objectives.

The Responsibility for Learning

Proposition 6 - Use DICT to Create Environments for Collaboration and Discussion between Teacher and Student-coaches

These environments have the potential to foster reflective thinking as an integral component of the learning process.

Taking responsibility for one's own learning is neither natural nor easy English (2013). As Weimer (2013) points out, learners often struggle in educational environments that are less structured and tightly controlled. For example, Stoszkowski et al. (2017) observed that student-coaches enrolled in university-based coach education programmes (CEP) expressed a desire for direction and guidance, and tended to disengage from their mentors when such interactions were not reflected in final grades. This behaviour highlights how performance on summative assessments tends to shape students' engagement Stoszkowski et al. (2018). However, difficulties with assuming responsibility for learning do not necessarily indicate a rejection of autonomy and self-determination. On the contrary, studies employing heutagogical approaches have found that learners value the opportunity to take ownership of their education and regard autonomy as a vital life skill Stoszkowski (2018). These challenges may instead reflect a lack of prior experience with autonomous learning Blumberg (2009), limited development in self-direction Weimer (2013), or issues related to emotional maturity and learners' understanding of learning processes McCarthy (2018) Stoszkowski (2017). Consequently, it is crucial to understand the characteristics and needs of student-coaches within CEPs, and to implement gradual strategies that promote responsibility for learning Salles (2019). Such skills are best developed through repeated opportunities to practise self-assessment and through the consistent provision of formative feedback to guide improvement Blumberg (2009).

Learning skills underpin the development of lifelong learners—coaches who can autonomously and continuously integrate new experiences into their personal and professional biographies Trudel et al. (2016). Within CEPs, learner-centred teaching (LCT) strategies that encourage such skill development include reflective practices and problem-based learning (PBL) activities Driska (2014) Roberts (2014). PBL fosters self-directed learning Blumberg (2009) and promotes critical thinking among coaches Jones (2006), by engaging them in solving real-life and practice-based situations. Given the inherent complexity and unpredictability of coaching, such strategies are essential for raising awareness of the need for lifelong learning. Project-based learning further contributes by enhancing autonomy, encouraging inquiry, setting goals, fostering collaboration and communication, and promoting reflection within real-world scenarios Kokotsaki et al. (2016). Moreover, these strategies can be enriched by the integration of digital instructional and communication technologies (DICT), enabling learners to explore non-traditional roles and engage in innovative formats such as role-playing and dramatization in virtual environments McCombs (2005).

Portfolios have also been utilised within coach education programmes (CEPs), including in electronic formats Galatti et al. (2019); Paquette et al. (2014); Dray (2019). This strategy encourages learners to engage actively with the learning process, promoting self-regulation and a sense of responsibility for their own development. Portfolios facilitate learners' awareness of their strengths and weaknesses, prompting reflective action aimed at improving learning outcomes Dray (2019). Moreover, when effectively implemented, portfolio use can support learners in progressing to more advanced stages of development McCombs et al. (2005).

The Purpose and Processes of Evaluation

Proposition 7 - Evaluate the Effectiveness of Technology to Meet the Diverse and Emerging Needs

It is essential to ensure alignment between the technologies employed and the underlying learning principles, while also considering the interests and needs of the learners.

When designing a CEP, Paquette (2018b) recommend employing a variety of assessment strategies, such as debriefs, formative feedback, peer review, and self-assessment. In addition to fostering student-coaches' engagement and responsibility for their own learning, as mentioned above, the portfolio can also serve as an evaluative tool Dray & Howells, (2019); Galatti et al. (2019); Paquette et al. (2014). Through their portfolio, learners demonstrate their understanding, shifts in learning, and metacognitive processes, making it a valuable instrument for promoting individual formative assessment and evaluating coursework Klenowski et al. (2006). According to McCombs and Vakili (2005), educators may encourage learners to develop electronic portfolios and other forms of authentic assessment to define and reflect their virtual participation. Notable benefits of the electronic portfolio include a high level of learner engagement with the tool, as well as the teacher's ability to provide contextualised and individualised feedback throughout the assessment process Dray (2019).

When employing diverse forms of assessment, it is crucial that the DICT utilised correspond to the individual needs of the learners. Otherwise, the purpose of the evaluation may not be fulfilled. For instance, some DICT platforms may be unintuitive or confusing (Stoszkowski et al., 2017), potentially leading to a lack of engagement from student-coaches. In such cases, not only is the formative purpose of assessment undermined, but the learners' educational experience as a whole may also be negatively affected. Therefore, in alignment with Propositions 2 and 6 of this essay, educators should ensure that the DICT selected both meet the learning objectives and are readily accessible and usable by the learners.

Final Considerations

The recommendations for coach education programmes grounded in LCT position the learner as the protagonist of the learning process, including in contexts where education is mediated by DICT and delivered through virtual environments. For DICT to become an integral part of this and other educational transformations, teachers must understand and apply the underlying LCT principles embedded in technological applications. The effective integration of DICT is, in turn, associated with teachers' positive attitudes towards technology, which depend on their competence and self-efficacy (Seifu, 2020). Beyond the individuals involved, the construction of a safe and supportive learning environment is also a crucial factor in the successful use of DICT for learning. The literature indicates that DICT can support learning through collaboration, counterbalancing the risks of technology fostering personal and social isolation or alienation (McCombs & Vakili, 2005). Through the use of DICT, teachers can deliver content in more flexible and inclusive ways, fostering online learner-centred environments. Ultimately, it is the underlying teaching philosophy that guides the pedagogical process. The seven propositions presented in this essay offer a framework for integrating DICT in alignment with learner-centred principles within university-based CEP. However, teachers' pedagogical reflections on context and learner characteristics should extend beyond these propositions. In conclusion, although there is growing academic discussion surrounding the use of DICT to promote learner-centred coach education, empirical evidence from practical interventions remains scarce. Future research should therefore aim to explore the effectiveness and potential impact of technological tools in learner-centred coach education.

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Conflicto de Intereses: Los autores declaran que no tienen conflictos de intereses relacionados con este estudio y que todos los procedimientos seguidos cumplen con los estándares éticos establecidos por la revista. Asimismo, confirman que este trabajo es inédito y no ha sido publicado, ni parcial ni totalmente, en ninguna otra publicación.