CHAPTER 2. THE CHALLENGE OF INITIAL TEACHER EDUCATION: POTENTIALITIES AND WEAKNESSES

Vânia Graça

Centre for Research in Education (CIEd), Institute of Education, University of Minho; Centre for Research and Innovation in Education (InEd), School of Education, Polytechnic Institute of Porto

Ana Rita Férias

University of Santiago de Compostela, Spain; School of Education, Polytechnic of Porto, Portugal

Paula Quadros-Flores

Centre for Research and Innovation in Education (InEd), School of Education, Polytechnic Institute

I. Introduction

In recent times, several governments and institutions have tried to adapt their educational systems to the digital society, a society that, along with the economy, has been rapidly transforming and becoming more technological (European Commission, 2020; Ministry of Economy and Digital Transition, 2020). Thus, there has been a clear concern in teacher training policies in Western countries and organisations that seek to support these policies, focusing not only on the development of digital skills through initial and continuing teacher training, but also through financial support for the implementation of technological equipment (Meirinhos & Osório, 2019; Silva et al., 2019).

Since it is urgent to prepare quality teachers for 21st century schools (Flores, 2015; Quadros-Flores, 2016), the development of digital skills of educators and teachers in initial training has been promoted, with a focus on skills development in the areas of technical and pedagogical knowledge, innovative active methodologies in context (Raposo-Rivas et al., 2020), and the construction of experiential knowledge that promotes innovative practices (Muñoz et al., 2015), in which ICT play a key role in the practices of teachers in training. Thus, all these profession-specific skills (Lucas &

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Moreira, 2018) are fundamental not only for changing educational practices, but also for renewing the professional teaching identity in the digital age (Quadros-Flores & Raposo-Rivas, 2017). However, despite the effort that has been made in initial training for methodological renewal and integration of educational technologies, particularly in Supervised Educational Practice, in which they intervene in real contexts, there are difficulties that inhibit the "disruptive innovation for being a challenge of radical transformation of traditional cultures" (Quadros-Flores & Ramos, 2016, p. 196). In this sense, the authors show that innovation must be gradual since it involves schools whose renewal is slow. On the other hand, the lack of technological equipment hinders educational practices, namely the development of renewed and creative practices, since the school equipment in schools still falls short of the expectations of the needs of the schools of the future (ANPRI, 2018; Graça et al., 2020; Quadros-Flores, 2016).

In this sense, this article is part of the IFITIC Project which aims to rethink educational practice with ICT in the initial training of future teachers, in order to promote methodological renewal in pre-school education and in the 1st and 2nd cycles of basic education. This is an exploratory and interpretative study in which, based on the analysis of the public internship reports of students in initial teacher training in the Master's Degree in Pre-school Education and Teaching in the 1st cycle of Basic Education, we seek to understand, from the analysis of the technological resources used and methodological options, the potentialities and weaknesses found by future teachers in the practices of the 1st cycle of Basic Education.

II. Theoretical framework

Initial teacher education is a crucial stage in the training of future teachers, the first stage in the construction of professional knowledge, representations, skills and emotions of what it means to be a teacher. It is a moment of socialisation in the educational reality, relevant in the construction of knowledge, the know-how of being and being where professional ethics is relevant in the self-perception of oneself and of others. Avoiding the weaknesses mentioned by Mesquita (2010)

> Some weaknesses found in initial training are presented, namely: a routinization of strategies in the preparation of teachers, which inhibits the development of educational innovation; an inability to adapt to changes operated by society and the school, in recent years; out-of-step training practices that do not find strategies that enable the articulation between

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> theory and practice; and difficulty of articulation with schools, where future teachers will work (p. 6)[1]

Initial teacher training is currently seeking to revitalise educational practices by integrating new, more active and innovative methodologies, based on varied resources that integrate the digital and analogy. Future teachers are stimulated to find integrative methodologies, supported by clear objectives that aim at the reconstruction of structural educational models. This integration implies the development of the teacher's digital, pedagogical and technical skills, in a permanent update, since "the Digital Competence of educators and teachers is increasingly called for the renewal of educational practices, so it is urgent to prepare future teachers for a school integrated in the digital society" (Graça et al., 2021, p. 27). Note that, according to Costa (2019), digital technologies can diversify pedagogical experiences in various domains and areas of knowledge, in different pretexts with different objectives and theoretical perceptions. In this sense, they can induce innovation in teaching and learning processes allowing achievements that were not possible before their existence. Conceiving digital technologies as cognitive tools, which enhance students' complex thinking (Jonassen, 2007), gives students the opportunity to build their knowledge through their use.

There are theoretical frameworks that seek to guide teachers and educators in the development of their digital skills. We highlight the DigCompEdu (Redecker, 2017) framework, which aims to support pedagogical practices that enhance student participation in the teaching and learning process using digital technologies. It is inspired by the progression model in Bloom's taxonomy and contemplates several levels of digital empowerment progression: (A1) - awareness; (A2) - exploration; (B1) - integration; (B2) - specialisation; (C1) - leadership and (C2) - innovation. The MINERVA project (1996-2004) and the Technological Plan for Education (2007) were important in the past, as they constituted a set of measures of ICT integration in Portuguese schools by the Government with the purpose of modernising schools preparing them for the demands of the technological age. Currently, the Ministry of Education's Program for Digital Empowerment of Schools (2020) stands out, whose main objective is to develop teachers' digital competencies with a view to a better efficiency in the pedagogical integration of ICT transversally in the different curricular areas.

Integrating technology in the educational process also requires a transformation of the teaching and learning paradigm itself, conceiving new

[1] quotation in Portuguese and translated into English.

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ways of learning how to learn, which implies changes at the methodological and curricular levels. At the curricular level, it has undergone changes being rethought considering the Digital Society strengthening digital skills as proposed by Prensky (2001) and Santaella (2010). Thus, a curriculum connected to digital technologies is proposed, in which networks of knowledge sharing, innovations and transformations are built, materialised in a web curriculum (Almeida & Silva, 2016). In this context, the curricular documents in force that guide the teaching and learning process, the Essential Learning (EA) (Direção-Geral da Educação, 2018) and the Profile of Students Leaving Compulsory Schooling (PASEO) (Oliveira-Martins et al., 2017), show that ICT emerges as an area of cross-curricular integration in the 1st cycle of basic education, in which all components of the curriculum are developed. Its insertion refers to the development of digital skills aimed at the exercise of active, critical and responsible citizenship, in which, throughout the four years, students develop: i) critical, reflected and responsible attitudes in the use of digital technologies, environments and services; ii) skills of research and analysis of online information; iii) ability to communicate appropriately, using digital media and resources; iv) creativity, through the exploration of ideas and the development of computational thinking with a view to the production of digital artefacts (p. 2).

There are also curricular guidelines for the use of ICT, which organise four important work domains: i) Digital Citizenship; ii) Investigate and Research; iii) Communicate and Collaborate; iv) Create and Innovate. Thus, it is important that curricular documents guiding educational practices are aligned with a digital curriculum, the web curriculum. For Valderrama-Hernández et al., (2021), cyber-citizenship currently encourages collective thinking through the interconnection of analyses of the concrete reality that surrounds us and makes it possible to work in networks, thus promoting learning diversity.

This integration implies methodological changes, given that it is necessary to rethink new, more active learning environments, and in this sense, active methodologies have assumed an important role in educational settings (Moran, 2018). It is intended, therefore, that students build their knowledge in a participatory, autonomous and responsible way, developing digital skills, enabling a transdisciplinary and entrepreneurial vision of knowledge. There are several active learning methodologies: Gamification, Problems based learning (PBL), Project based learning (PBL), Peer Instruction, Flipped Classroom, Just-in-Time Teaching, Design thinking, Rotation by stations, and others (Silva, 2020).

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This implies, in turn, that it is also reflected in the organisation of the classroom space itself, since the physical environment of school buildings influences the performance of students and teachers (Guardino & Fullerton, 2010). It is therefore crucial, to reflectively rethink the integration of technology in these environments. However, the motivation of teachers and educators is influenced by digital devices in the school context (Quadros-Flores et al., 2013), which is sometimes reflected as an inhibiting factor in the pedagogical integration of ICT in educational practices (Graça et al., 2021). Therefore, when we refer to Supervised Teaching Practice (STP) operationalized in real contexts, we must consider not only the didactic and pedagogical knowledge of future teachers, but also the devices available for educational practice.

We believe that the construction of renewed educational practices lies essentially in the combination of the use of digital technologies with active learning methodologies, and therefore we guide future teachers in initial training in this direction because we believe in their potential, but we recognize that there are weaknesses in the integration of this combination in the students' practices. In order to better manage and empower the ICT training and promote strategies that integrate digital technology, using their internship reports we seek to understand: What digital devices do the students in initial teacher training have available in their educational contexts?; What weaknesses do the students in initial teacher training find in their practice?; What kind of activities, strategies, methodologies do they carry out in the schools where their internship takes place? This is why we want to better understand this reality to better act in the initial training of teachers.

III. Methodological options of the study

This article is part of the IFITIC Project, which aims to rethink educational practice with ICT in the initial training of future teachers to promote methodological renewal in preschool education and in the 1st and 2nd cycles of basic education. In this sense, it focuses on students in the initial teacher training of the Master's Degree in Pre-school Education and Teaching in the 1st cycle of Basic Education, in which we will try to analyse public internship reports, paying attention to the educational practices developed in the 1st cycle of Basic Education.

This is an exploratory and interpretative study, based on a quantitative analysis, supported by internship reports that are public from the year 2022. Only the reports that were in the ESE repository, and therefore of public

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access, were considered. The writing of this internship report is a mandatory requirement for the conception of a master's degree. It includes all the educational practice developed in the internship context in the two valences for which the master's degree qualifies. In this sense, we tried to answer the following questions by analysing them: i) What digital devices do students in initial teacher training have available in their educational contexts? ii) What kind of activities, strategies, methodologies do they carry out in the schools where their internship takes place; and iii) What weaknesses do students in initial teacher training find in their practice? We analysed 21 internship reports, of which 20 were written by female and 1 by male students.

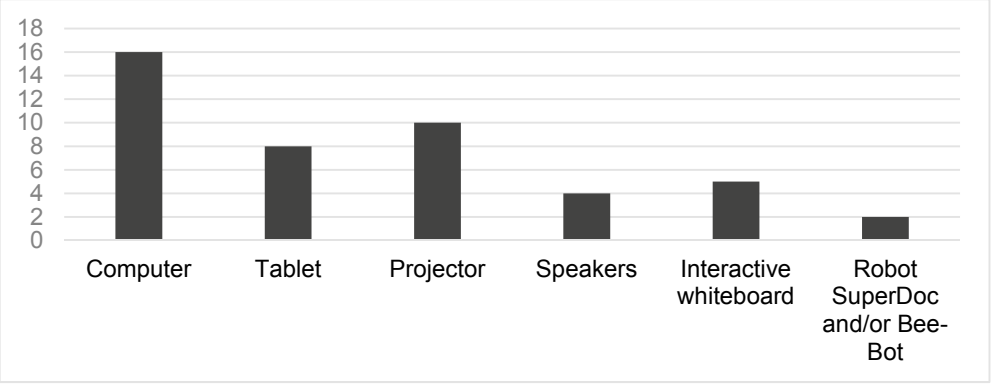
IV. Analysis (and discussion) of the results

4.1. Digital devices available in the internship centres

Knowing the digital devices available in the internship contexts reflects the possibilities offered for the construction of more innovative educational practices, in which ICT is a means for the development of their students' learning. In this sense, it is important for us to know this same reality, trying to understand what technological park is available in the educational contexts (Figure 1).

Figure 1.

Digital devices available in the internship contexts



Source: own elaboration.

The results in Figure 1 show that the learning centres have basic technological equipment and resources, namely "computer", "projector", "tablet" and "speakers". Not all educational centres have speakers and interactive whiteboards, and the resources for Initiation to Programming in

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1st Basic School, namely the *Super-Doc* and/or *Bee-Bot* robots, are scarce, with only 9.5% of the educational contexts having these resources.

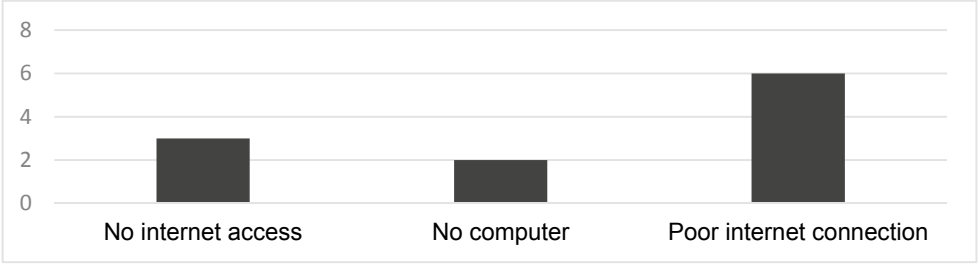
Regarding this small number of robots, it is possible that its justification comes from the recent inclusion of Robotics and Computational Thinking in Education in Portugal. The programme "Programming in the first cycle of Basic Education" (Figueiredo & Torres, 2015) was created in 2015, in which guidelines on computational thinking were created, which later included suggestions from Educational Robotics. In 2018, Educational Robotics and Computational Thinking became part of the official documents of the Directorate-General for Education and its use began to be inherent in teaching practices.

It is understood that, for renewed and innovative practices to be possible, with a technological dimension that accompanies the creative and methodological pedagogical processes, it is necessary that the contexts are also renewed and accompany this growth, with the integration of various technological elements that allow for the diversification and creation of new practices. Thus, we conclude that the digital devices available in the internship centres are still part of a construction process (Ramos et al. 2011), a process that possibly requires investment not only in the insertion of new digital devices, but also in training for their use in new practices.

Knowing that the digital devices available in educational settings influence the educational practices of future teachers as they are sometimes factors that inhibit the construction of more innovative practices (Graça et al., 2020), we wanted to understand the weaknesses pointed out by students in initial teacher training (Figure 2).

Figure 2.

Weaknesses/difficulties pointed out by students in initial teacher training in their educational practice.



Source: own elaboration.

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Despite the effort that has been felt in the context of the modernisation of schools - by the Parque Escolar programme (Portal Parque Escolar, n.d.), or even the Action Plan for Digital Transition in Portugal (Ministry of Economy and Digital Transition, 2020), with its various projects, including the Education project called Digital School that is currently in force - the difficulty in accessing the Internet is one of the major factors identified by students, which hinder the implementation of innovative practices with the involvement of ICTs in their internship contexts.

Thus, being considered as a desirable outcome, according to the latest edition of the State of Education (CNE, 2021), "the proportion of schools with access to internet and computers for teaching purposes" (p. 28), in which the equipment with internet connection has increased, it was deduced that most students presented as the greatest weakness for the development of their innovative practices the "poor internet connection", followed by the option of "no internet access", which implied, in some moments of the students' practices, the adequacy (through the use of their personal mobile networks) and/or adaptation of the digital tools already prepared.

The lack of a computer in the classroom was also identified as a weakness, which compelled students to use their own personal equipment to boost their practices. Thus, it was found that students in initial training often, together with their Higher Education institution and the IFITIC project that provides surfaces for request (integrated in InEd, Centre for Research & Innovation in Education), ensure the necessary resources and tools to carry out educational practices with ICTs.

In addition, when they found some ICT equipment, they reported that it did not work or was not enough for the purpose of the lesson, which implies that there is a need for greater investment in the maintenance of the technological park available in educational settings, namely the operation of the internet (either through a network or via WiFi) and the available computers. Therefore, it is assumed the perspective advocated by Graça et al. (2021) when they indicate that there are inhibitors to the use of ICT, namely the technological resources and equipment of the educational centres of training.

4.2. Digital technologies and active methodologies used in their educational practices

We also wanted to understand which digital technologies students in initial teacher education used in their internship context, since they reflect the pedagogical intentionality underlying the action. To this end, we used a word

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cloud that shows, through their internship reports, the digital technologies most used by students (Figure 3). In the word cloud, the size of the words is directly proportional to their frequency in the text.

Figure 3.

Word cloud regarding the digital technologies most used by students in initial teacher training.

Source: own elaboration using the WordArt digital platform.

In fact, identifying the digital technologies used by students in initial teacher training enables us to understand the underlying pedagogical intentions. In this sense, "Padlet" was the tool most used by students in their practices. This tool allows for the creation of interactive murals that enhance the interaction between the teacher and the student, through the exchange of ideas, activities and materials (Silva & Lima, 2018).

The following words stand out: "Bee-bot", a robot used for the development of computational thinking and spatial orientation, through programming language; the digital platform "Wordwall", aimed at assessment and gamification, which leads to the development of skills such as logical reasoning, autonomy, concentration and dexterity (Jesus & Mota, 2021; Sales et al., 2022). Likewise, the word "Voki" is highlighted, which shows that students integrate avatars into their practices, thus increasing the motivation to complete the proposed tasks (Quadros-Flores et al., 2018).

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Also, in the scope of the development of computational thinking and programming language, "Scratch" is mentioned. With the same visual stain, the digital platforms "Canva" and "QRCode" are highlighted, for content creation; "Zoom", a technological tool that enables communication between individuals.

In terms of gamification and assessment, students also mention "Kahoot", "Plickers", "Quizizz", "Socrative" as platforms that allow the application of the knowledge built throughout the pedagogical activities, the self-regulation given by the immediate feedback, involving the student in the process of self and hetero-assessment and the teacher as a professional who intervenes immediately in the class or in the group of students who have obtained unsatisfactory results. There are also digital platforms which allow the construction of idea maps about the subjects to be studied, such as "Mentimeter", "Bubblu.us" and "Vengage". There is also a tendency for students to use Office tools, such as "PowerPoint" and "Word", as well as digital platforms that allow the viewing of video content, such as "Youtube" and "Edpuzzle". Also mentioned are digital publishing platforms such as "Flipsnack" and even "Storyjumper", as well as "Lucidchart" for creating online diagrams.

Thus, future teachers integrate different digital technologies in their educational practice, which reflect different pedagogical intentions that favour the teaching and learning process of students. They are aligned with an open education in a humanistic paradigm where the student knows and knows how to do, involving himself in the learning process where he builds knowledge and representations about reality in connection with peers and others. Thus, it should be noted that, currently, teacher training institutions attend to the development of the future teacher's digital skills, aligned with the guidelines recommended by the theoretical frameworks that prepare them for the challenges of a digital school (Graça et al., 2021), stimulating the mobilisation of this knowledge in a pedagogical and articulating range of knowledge in the understanding of reality.

Thus, being aware that the integration of digital technologies in the teaching and learning process should be combined with active and participatory methodologies, we sought to understand which methodologies were used by students in initial teacher training (Figure 4). It should be noted that, throughout their educational practices, students used several methodologies.

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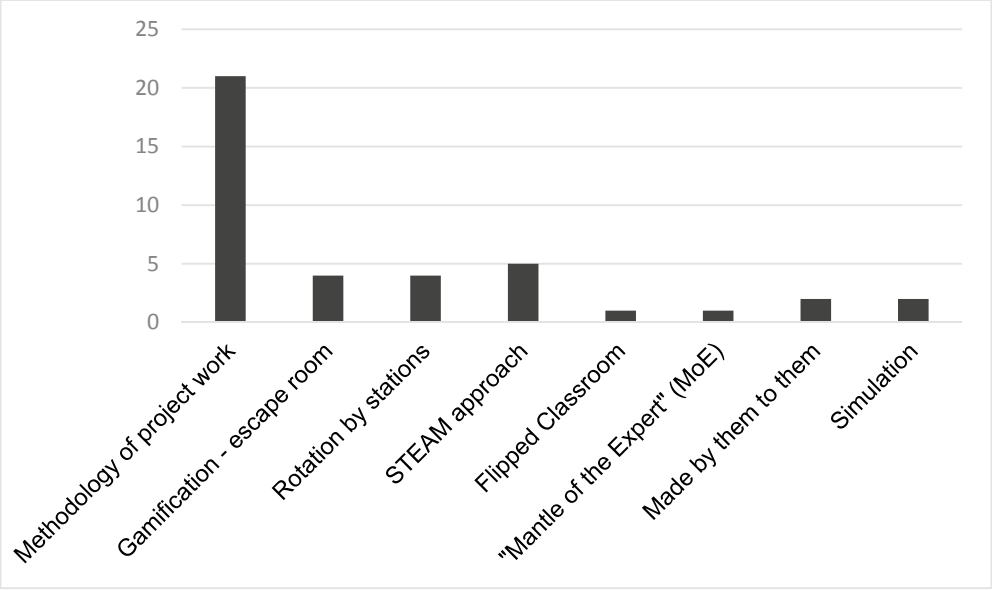
Figure 4.

Active methodologies used by students in initial teacher training in their educational practices.



Source: own elaboration.

The predominance of the use of the "Project Work Methodology" in the educational practices of the students in initial teacher training is remarkable (100%) since it allows breaking away from the traditional stigma and favours the development of inter and transdisciplinarity that promotes divergent thinking and a multidimensionality that diversifies the processes and promotes autonomy and significant learning. With 23.8%, the "STEAM approach" stands out for its potential to integrate knowledge from Arts, Sciences, Technology, Engineering and Mathematics to solve real problems, preparing students for societal challenges. Problem-based learning is a new way of learning that gives meaning to learning and promotes the development of logical

and cognitive reasoning that favours students' complex thinking (Jonassen, 2007) and the development of personal skills applicable in students' lives.

The methodologies "Gamification - escape room" and "Rotation by stations", with 19%, are also mobilised for the pedagogical activities of students in

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initial training with their students, since the first one allows "developing cognitive, emotional and social skills, stimulating creativity, critical thinking and decision-making and leadership skills in solving tasks, problems and puzzles that are related to the content to be addressed during the class" (Pereira et al., 2020, p. 1009). The second, favours the involvement and motivation of students because they assume an active role in their learning (Alvarenga Souza et al., 2020).

The chart also shows, with a less significant percentage of 9.5%, the active methodologies "Simulation" and "Made by them to them", since the first creates motivation in the student to learn and act in accordance with the learning that the teacher intends, and the second combines three important steps in the learning process: the Flipped Classroom in the "prepare-do" and Storytelling in the "make-tell" that together form the triad "see-reflect-evaluate" (Quadros-Flores et al., 2019). And therefore, enhancers of active learning of students.

Thus, it can be concluded that students in initial teacher training seek to integrate in their educational practices, active methodologies in different moments of the lesson, offering opportunities for students to construct their knowledge in an active, participatory and autonomous way (Moran, 2018).

V. Conclusions

Understanding the realities of the educational contexts of students in initial teacher training, as well as their methodological and technological options, make it possible to identify potentialities and weaknesses in their educational practices. The implementation of renewed and innovative practices requires the necessary conditions for the pedagogical integration of digital technologies, in which the educational contexts must accompany this renewal and growth of technological equipment in an effective way, namely regarding their quality, quantity and diversification. It was found that, given the lack of resources found in cooperating schools, future teachers, thanks to their personal equipment and support from the higher education institution, found opportunities in educational spaces, assuming a teaching profile capable of solving problems and designing and developing practices that respond to the current curriculum. Furthermore, it was found that students in initial teacher training recognise the potential of the various digital tools and are able to assign different pedagogical intentions in a constant articulation with the guiding documents of educational practice.

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Training teachers in line with a changing paradigm requires a strong vision from higher institutions, an aligned collaboration with cooperating schools and a willingness to be a teacher in the 21st century by future teachers.

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References

Almeida, M. E. B., & da Silva, M. D. G. M. (2016). Web currículo: contexto, aprendizado e conhecimento. Apresentação do dossiê temático. *Revista e-Curriculum*, *14*(3), 767-773.

Alvarenga Souza, P., La Torre, O., & Peixoto, G. (2020). Rotação por estações: experimentação de uma proposta didática a alunos do ensino médio, no estudo de progressões por meio dos fractais. *Research, Society and Development*, *9*(10), e4219108804-e421910880

ANPRI. (2018). Carta Aberta ao Senhor Ministro da Educação - O que a ANPRI pretende ouvir no Fórum do Incode2030. Direção da ANPRI. https://www.anpri.pt/mod/forum/discuss.php?d=6239

Club Kinder Sport (2019). *El Club de los Jóvenes Deportistas. Proyecto Kinder+Sport*. Retrieved from https://www.clubkindersport.es/kinder-sport

Coalter, F. (2005). Sport, social inclusion and crime reduction. In G. E. J. Faulkner & A. H. Taylor (Ed.), *Exercise, Health and Mental Health: Emerging Relationships* (pp. 190-209). Oxon: Routledge.

Coalter, F. (2017). Sport and social inclusion: evidence-based policy and practice. *Social inclusion, 5*(2), 141-149.

Comisión Europea. (2017). Comunicación de la Comisión al Parlamento Europeo, al Consejo, al Comité Económico y Social Europeo y al Comité de las Regiones**.** COM (2017/) 673 final.

ISBN: 978-84-1170-659-9

Comisión Europea. (2021). Comunicación de la Comisión al Parlamento Europeo, al Consejo, al Comité Económico y Social Europeo y al Comité de las Regiones sobre el Plan de Acción para la Democracia Europea. COM(2021) 102 final.

Comisión Europea. (2021). Comunicación de la Comisión al Parlamento Europeo, al Consejo, al Comité Económico y Social Europeo y al Comité de las Regiones EMPTY. COM (2021) 101, de 3 de marzo de 2021.

Conde-Jiménez, J. & Gómez-Rey, P. (2020). *Inclusión Social a través del Deporte en el contexto europeo. proyecto DISCIPLINS*. Presented in IV Jornadas Educativas de Actividad Física y Deportivas en el Medio Natural: APS en la cuarentena. Sevilla: Universidad de Sevilla.

Conselho Nacional de Educação (CNE). (2021). *Estado da Educação 2020*. https://www.cnedu.pt/content/edicoes/estado_da_educacao/EE2020_WEB_04.pdf

Costa, F. A. (2019). Reflexões sobre a integração de tecnologias digitais na escola. *Língua e Literacia(s) no Século XXI*. 14–39.

Dagkas, S. (2018). "Is social inclusion through PE, Sport and PA still a rhetoric?" Evaluating the relationship between physical education, sport and social inclusion. *Educational Review, 70*(1), 67-74.

Direção-Geral de Educação (2018). *Aprendizagens Essenciais: 1.º ciclo do ensino básico*.

Direção-Geral de Estatísticas da Educação e Ciência. (2021). *Computadores, Quadros Interativos e Videoprojetores na sala de Aula*. https://www.dgeec.mec.pt/np4/cqv.html

European Comission. (2020). *Digital Education Action Plan 2021-2027. Resetting education and training for the digital age*. European Union. https://education.ec.europa.eu/sites/default/files/document-library-docs/deap-communication-sept2020_en.pdf

Etxarte, U. A., Arregui, J. A. & Rosell, I. (2019). Deporte e inclusión social en Gipuzkoa: es tiempo para las políticas. *Revista Española de Educación Física y Deportes*, (426), 586-598.

ISBN: 978-84-1170-659-9

Federazione Italiana Pallavolo (2019). *Guida pratica per l'attività promozionale in ambito federale e scolastico*. Retrieved from https://guidapratica.federvolley.it/scuola-e-promozione/guida-tecnica-s3-2017-2018.

Fernández, I. (2017). Las políticas de la Unión Europea en el ámbito del deporte. Educación Social. *Revista de Intervención Socioeducativa,* (65), 57-74.

Fernández-Pérez, F., Fernández-Domínguez, L. C. & Valle Lorenzo, F. (2018). El deporte como medio de inclusión en condiciones de vulnerabilidad. *Podium. Revista de Ciencia y Tecnología en la Cultura Física, 13*(2), 109-119.

Figueiredo, M., & Torres, J. V. (2015). *Iniciação à Programação no 1.º Ciclo do Ensino Básico*. Lisboa: Direção Geral de Educação.

Flores, M. A. (2015). Formação de professores: questões críticas e desafios a considerar.In C. N. de Educação (Ed.)Formação Inicial de Professores (pp. 192–222).Conselho Nacional de Educação (CNE).

GEPE, (2007), *Plano Tecnológico da Educação - Resolução do Conselho de Ministros n.º 137/2007*, http://www.escola.gov.pt/pte/PT/Biblioteca/Publicações/index.htm

Gibbs, L. & Block, K. (2017). Promoting social inclusion through sport for refugee-background youth in Australia: Analysing different participation models. *Social Inclusion, 5*(2), 91-100.

Graça, V.; Quadros-Flores, P., Raposo-Rivas, M. y Ramos, A. (2021). As TIC na formação inicial de formadores e professores. *Revista Latinoamericana de Tecnología Educativa,* 20(1), 27-37.

Guardino, C. A., & Fullerton, E. (2010). Changing behaviours by changing the classroom environment. *Teaching exceptional children*, 42(6), 8-13.

Jesus, R. & Mota, V. (2021). Ensino remoto: apresentação de jogos da plataforma Wordwall para ensinar estatística nos anos iniciais. *Revista científica Multidisciplinar Núcleo do Conhecimento,* 4, 102-122. http://dx.doi.org/10.32749/nucleodoconhecimento.com.br/educacao/apresentacao-de-jogos

ISBN: 978-84-1170-659-9

Jonassen, D. (2007). *Computadores, Ferramentas Cognitivas: Desenvolver o pensamento crítico nas escolas*. Porto Editora.

Limón-Domínguez, D., Conde-Jiménez, J., De la Calle, A., Gómez-Rey, P., Reyes, S. & Torres Fernández. C. (2020). DISCIPLINS. El deporte como herramienta para lograr la inclusión social. In E. López-Meneses, D. Cobos-Sanchiz, L. Molina-García, A. Jaén-Martínez & A. Martín-Padilla (Ed.), *Claves para la innovación pedagógica ante los nuevos retos. Respuestas en la vanguardia de la práctica educativa* (pp. 3974-3980). Barcelona: Octaedro.

Lucas, M., & Moreira, A. (2018). DigCompEdu: Quadro Europeu de Competência Digital para Educadores. UA Editora. https://ria.ua.pt/handle/10773/24983

Maza, G. & Sánchez, R. (2012). Deporte e inmigración: una reflexión crítica. *Anduli. Revista Andaluza de Ciencias Sociales,* (11), 41-54.

Meirinhos, M., & Osório, A. (2019). Referenciais de competências digitais para a formação de professores. In *Challenges 2019: Desafios da Inteligência Artificial, Artificial Intelligence Challenges* (pp. 1001–1016). Universidade do Minho

Ministério da Economia e Transição Digital. (2020). *Plano de Ação para a Transição Digital de Portugal*. Editora do Ministério da Economia e Transição Digital. https://www.portugal.gov.pt/gc22/portugal-digital/plano-de-acao-para-a-transicao-digital-pdf.aspx

Mesquita, E. (2010). Formação inicial, profissão docente e competências para a docência: a visão dos futuros professores. *EDUSER: revista de educação*, 3-19.

Direção-Geral de Educação (2018). *Aprendizagens Essenciais: 1.º ciclo do ensino básico*.

Morán, J. (2018). Metodologias ativas para uma aprendizagem mais profunda. In L. Bacich & J. Moran (Orgs.), *Metodologias ativas para uma educação inovadora: uma abordagem teórico-prática.* Penso Editora.

Morgan, H., Parker, A. & Roberts, W. (2019). Community sport programmes and social inclusion: what role for positive psychological capital? *Sport in Society, 22*(6), 1100-1114.

ISBN: 978-84-1170-659-9

Moscoso, D. & Muñoz, V. (2012). Sport, social inclusion and diversity, background view. *Anduli. Revista Andaluza de Ciencias Sociales*, (11), 13-19.

Muñoz, R., Barrio, F., Britto, J., Torres, J., & Rebaque, B. (2015). La formación del profesorado en Tecnología Educativa: prácticas profesionales. RELATEC -Revista Latinoamericana de Tecnología Educativa, 14(1), 115–132. https://doi.org/10.17398/1695-288X.14.1.115

Oliveira-Martins, G., Gomes, C., Brocardo, J., Pedroso, J., Carrilho, J., Silva, L., Encarnação, M., Horta, M., Calçada, M., Nery, R. y Rodrigues, S. (2017). *Relatório Técnico- Perfil dos alunos à Saída da Escolaridade Obrigatória*. Ministério da Educação.

Organización para las Naciones Unidas. (2015). Transformar nuestro mundo: la Agenda 2030 para el Desarrollo Sostenible. Resolución aprobada por la Asamblea General el 25 de septiembre de 2015. A/RES/70/1, 21 de octubre.

Pereira, A., Sampaio, E., Quadro-Flores, P., & Mascarenhas, D. (2020). *Outros modos de ensinar a aprender no 1.º CEB: Escape Room.* 1007-1016. http://dx.doi.org/10.4995/INN2019.2019.10104

Prensky, M. (2001). Digital Natives, Digital Immigrants. *On the Horizon*, 9(5), 1–6.

Quadros-Flores, P.; Flores, A.; Ramos, A.; Peres, A. (2019). Deles para eles: quando os processos se tornam produtos e de novo processos. In: Osório, A.; Gomes M.; Valente; A. *Challenges 2019: Desafios da Inteligência Artificial.* Braga: Centro de Competência da Universidade do Minho, 2019, p. 885–894.

Quadros-Flores, P. A., Marta, M. C., & de Sá, S. M. (2018). Criatividade com avatares na prática educativa supervisionada. *Revista Prácticum, 3*(2), 60-76.

Quadros-Flores, P., & Raposo-Rivas, M. (2017). A inclusão de tecnologias digitais na educação: (re)construção da identidade profissional docente na prática. *Revista Practicum, 2*(2), 2–17. https://doi.org/10.24310/RevPracticumrep.v2i2.9855

ISBN: 978-84-1170-659-9

Quadros-Flores, P. (2016). A Identidade Profissional e as TIC: estudo de boas Práticas no 1.º CEB na região Porto. Novas Edições Académicas.

Quadros-Flores, P. & Ramos, A. (2016). Práticas com TIC potenciadoras de mudança. In Mesquita, Cristina; Pires, Manuel Vara; Lopes, Rui Pedro (eds). *1º. Encontro Internacional de Formação na Docência* (INCTE) (p.195-203,). Bragança: Instituto Politécnico. ISBN 978-972-745-206-4.

Quadros-Flores, P., Peres, A., & Escola, J. (2013). Identidade profissional docente e as TIC: estudo de boas práticas no 1.º CEB na região do Porto. In M. Raposo-Rivas, J. J. J. Escola, M. E. Martínez-Figueira, & A. P. F. Aires (Coords.). *As TIC no ensino: políticas, usos e realidades* (pp. 323-342). Andavira Editora.

Ramos, J.L, Teodoro, V.D., & Ferreira, F. M. (2011). Recursos educativos digitais. Reflexões sobre a prática. In *Cadernos SACAUSEF VII* (pp. 11–34). Ministério da Educação e Ciência/DGIDC. http://hdl.handle.net/10174/5051

Raposo-Rivas, M., Quadros-Flores, P., Martínez-Figueira, E., Pereira da Silva, A., & Tellado-González, F. (2020). Utilización de TIC para la innovación en el Prácticum. Revista Practicum, 5(1), 22-36. https://doi.org/10.24310/RevPracticumrep.v5i1.9814

Redecker, C. (2017). *European framework for the digital competence of educators: DigCompEdu* (No. JRC107466). Joint Research Centre.

Ríos-Hernández, M. (2017). El deporte como recurso educativo en la inclusión social. *Educació Social. Revista d'Intervenció Socioeducativa,* (65), 44-56.

Ryom, K. & Stelter, R. (2017). Using team sport (football) to enhance social inclusion, what pitfalls exist and what about the slurred perspective of measurements? In *XIV Congreso Mundial ISSP de Psicología del Deporte 2017*, 10-14 de julio. Sevilla: Sociedad Internacional de Psicología del Deporte.

Sales, D., Guilherme, R., Junior, E., & Sete, D. (2022). O uso da plataforma Wordwall como estratégia no ensino de química. *Brazilian Journal of Development*, 8(3), 16959-16967. https://doi.org/10.34117/bjdv8n3-097

Santaella, L. (2010). *A ecologia pluralista da comunicação. Conectividade, mobilidade, ubiquidade.* Paulus.

ISBN: 978-84-1170-659-9

Schaillée, H., Haudenhuyse, R. & Bradt, L. (2019). Community sport and social inclusion: international perspectives. *Sport in Society*, *22*(6), 885-896.

Silva, R., Raimundo, I., Rato, V., & Martins, F. (2019). TPACK: uma proposta de integração da tecnologia na aula de matemática. *Exedra Número Temático - EIPE 2019*, 166–181.

Silva, A. (2020). *Guia prático de metodologias ativas com uso de tecnologias digitais da informação e comunicação*. UFLA, ISBN: 978-65-86561-02-9

Silva, P. G., & de Lima, D. S. (2018). Padlet Como Ambiente Virtual De Aprendizagem Na Formação De Profissionais Da Educação. *RENOTE,* 16(1).

Suzuki, N. (2017). A capability approach to understanding sport for social inclusion: Agency, structure and organisations. *Social Inclusion*, *5*(2), 150-158.

Valderrama-Hernández, R., Solis-Espallargas, C., Trigueros, G., Manjón, J. & Limón-Domínguez, D. (2015). El deporte para todos como propuesta educativa para la inclusión y sustentabilidad social. *Revista Fuentes,* (16), 199-222.

Valderrama-Hernández, R., Fernández, C., & Limón-Domínguez, D. (2021). Desafíos de la educación ambiental a través del aprendizaje ubicuo. *Innovación e investigación sobre el aprendizaje ubicuo y móvil en la Educación Superior*. Octaedro. https://doi.org/10.36006/16145-11

ISBN: 978-84-1170-659-9