Conceptions of teaching skills in distance learning: a comparative analysis of the literature and the digital competency frameworks

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***Abstract*— This qualitative study conducts a comparative content analysis of the conceptions of online lecturer competence identified in the literature on distance learning and those proposed in three international digital competence frameworks for educators developed by the European Union, UNESCO, and the International Society for Technology in Education. This analysis aims to: (i) identify the conceptions of teaching competence advocated in distance learning studies and international digital competence frameworks, and (ii) characterise the main similarities and differences regarding these conceptions. The relevance of this study lies in the need to update and expand the competences required of lecturers in the online context. The results indicate that specific competences for online lecturers emphasise pedagogical and technological aspects directly related to distance teaching practice, whereas the international digital competence frameworks address a more comprehensive set of skills, including ethical, safety, and digital citizenship issues. It is concluded that lecturers' competences for online teaching transcend technical and pedagogical dimensions, equally integrating social and cultural competences. The study contributes to a broader understanding of online lecturer competences, providing insights for future teacher training initiatives in distance learning.**

Keywords*— *distance learning; online lecturer competences; digital competence frameworks; teacher training

I. Introduction

Distance learning is characterised by the physical separation between the lecturer and the student, mediated by technologies that overcome geographical and temporal barriers [1]. It emerges as a suitable and desirable educational modality to meet the new and growing demands of the digital age, being seen as a pedagogical approach offering diverse possibilities such as personalised learning, flexible timetables, and expanded access to educational content [2]. In this context, the use of digital technologies promotes opportunities for interaction, collaboration, and knowledge construction among participants located in different geographical regions [3].

However, distance learning also faces significant challenges, such as the need for technological skills for effective participation in online environments, making the development of digital competences crucial for both lecturers and students. The concept of competence is complex and has been subject to various interpretations. For this study, we adopted the definition from the European Reference Framework for Key Competences for Lifelong Learning [4, p. 3], which defines competence as "a combination of knowledge, skills and attitudes appropriate to the context".

This qualitative study conducts a comparative content analysis of the conceptions of online lecturer competence present in distance learning studies and the competences proposed in three international digital competence frameworks for educators developed by the European Union (EU), UNESCO, and the International Society for Technology in Education (ISTE). This analysis aims to: (i) identify the conceptions of teaching competence advocated in distance learning studies and international digital competence frameworks, and (ii) characterise the main similarities and differences regarding these conceptions. The relevance of the study focuses on the need to update lecturers' competences, whether in online or face-to-face environments, in the face of the current digital society context that places education and lecturers at the centre of an emerging training agenda. The research may yield scientific knowledge for future lecturer training initiatives in distance learning.

II. Online Lecturer Competences in Distance Learning

A. Distance learning and 21st-Century Key Competences

The integration of Distance learning as an educational modality has garnered increasing interest, particularly in the context of developing 21st-century key competences. This is because Distance learning promotes temporal and spatial flexibility, coupled with the use of innovative technologies, which are essential facilitators for online learning. Online lecturers are expected to possess the competences required in the educational cyberspace, extending far beyond merely mastering hardware (screen, mouse, keyboard), software (computer programs), and technological resources. The concept of competence takes on multiple definitions and has been a subject of debate among scholars and organisations from diverse fields since the beginning of this century.

Since the OECD's "Definition and Selection of Competencies (DeSeCo)" project [5], which defines key competences as a necessary asset for all individuals to participate effectively in multiple social contexts or domains, contributing to the overall life success of each individual and the proper functioning of society, the European Union has been promoting initiatives aimed at guiding Member States in developing essential competences for all citizens, preparing them for the constantly transforming labour market and for active citizenship. In 2006, the European Commission published the report Key Competences for Lifelong Learning

European Reference Framework [6]. The framework identifies and defines eight key competences, considered equally important, interdependent, and complementary for promoting a successful life in the knowledge society. In 2016, the European Commission adopted a New Skills Agenda for Europe [7] to update and address skills gaps and mismatches in relation to labour market needs, offering guidance for training consistent with new market demands and access to quality jobs. In 2018, the EU updated key competences with a new framework, the current "European Reference Framework for Key Competences for Lifelong Learning" [4]. In 2020, the European Commission presented the current Digital Education Action Plan (2021-2027), a framework addressing a renewed European Union policy initiative whose objective is to support the sustainable and effective adaptation of EU Member States' education and training systems to the digital era [8].

All these initiatives reiterate the importance and concern of the European Union in improving essential competences and guiding Member States regarding the training of European citizens, preparing them for the constant mutations of the world and for new social and professional demands. In this context, traditional teaching processes are called into question. Educating for uncertainty requires a new educational paradigm compatible with the development of competences and learning capable of preparing citizens to live in societies and produce in labour markets and economic models yet unknown. In this context, Distance learning, enriched by digital technologies, emerges as an appropriate pedagogical approach for teaching grounded in competence development, as it offers various strategies, such as personalised learning, flexible timetables, and expanded access to content, making it one of the educational modalities considered relevant to meet the demands of this digital era [2]. In this teaching model, the lecturer's profile must encompass digital competences, in addition to innovative pedagogical actions for teaching and learning.

B. Online Lecturer Competences

The literature on Distance learning is quite diverse in defining the competences of online lecturers. According to Valadares [9], the role of the online lecturer in Distance learning is to create effective constructivist and investigative online environments, which demands far more than just scientific and didactic competences. They should possess: (i) competences regarding the content to be taught; (ii) methodological competences; (iii) technological competences; (iv) tutoring competences; and (v) management, coordination, or administration competences. For the author, "the competences required of a distance learning lecturer transcend those classically required in face-to-face teaching" (p. 141). For Tractenberg and Tractenberg [10], the distance learning requires more planning and organisation due to the new forms of presence, spatiality, and temporality involved in this pedagogical model. The authors classify online lecturer competences into four main groups or areas: (i) pedagogical competences (mastery of teaching-learning methods) and technical competences (mastery of content); (ii) socio-affective competences (abilities to create an interpersonal environment conducive to learning); (iii) management competences (abilities to organise and coordinate course-related activities and procedures); and (iv) technological competences (mastery of information and communication technologies required for conducting activities). In turn, Palloff et al. [11] present several key competences that, globally, include: (i) technological competences (skills in using educational technologies, online learning platforms, and digital tools); (ii) pedagogical competences (understanding the characteristics of the online environment, the importance of asynchronous interaction, building virtual communities, and adapting pedagogical strategies for the digital medium); (iii) instructional competences (ability to engage students, provide guidance, facilitate meaningful discussions, and offer constructive feedback); (iv) communication and collaboration competences (ability to articulate ideas clearly and concisely, promoting effective understanding of concepts, possessing interpersonal communication, and knowing how to work collaboratively, in a team); and (v) instructional design competences (ability to plan instructional materials and choose appropriate pedagogical strategies for the virtual modality).

In our view, the competences presented by Valadares [9], Tractenberg and Tractenberg [10], and Palloff et al. [11], broadly comprise three dimensions: scientific, pedagogical, and technological. Scientific competences relate to the knowledge of the content of the subjects the lecturer teaches; pedagogical competences refer to online facilitation (communication, interaction, guidance, and student monitoring); and technological competences are linked to the appropriate use of technological resources and the creation of digital resources. All these competences are fundamental for online lecturers to offer quality learning experiences, promoting student engagement and success in the digital environment.

More recent studies [12], [13], [14], [15], conducted during the COVID-19 pandemic, reinforce the definitions of lecturer competences for online teaching, categorising them into three broad areas: (i) pedagogical competences; (ii) online instructional design competences; and (iii) online assessment competences. According to these studies, pedagogical competences relate to the mastery of the content to be taught and the strategies, interaction, and mediation of this content with students. Instructional competences are linked to the effective use of digital resources for the development, organisation, and guidance of activities, and assessment competences correspond to the ability to adopt new assessment models cohesive with teaching conducted online and entirely at a distance.

Overall, we observe that the conceptions of these authors corroborate Mishra and Koehler's [16] proposals on the TPACK model, demonstrating that lecturer competences are not limited to technological mastery but require a balanced integration of pedagogical and content knowledge.

Furthermore, international organisations such as ISTE, UNESCO, and the European Union, consistent with 21st-century key competences, have developed digital competence frameworks for educators to empower them to use digital technologies in learning and training contexts [17], [18]. According to these bodies, developing digital competences in lecturers is crucial for developing 21st-century key competences in students, who are future citizens of this digital society. Digital competences encompass three dimensions: knowledge (knowing), skills (knowing how to do), and attitudes (knowing how to be and coexist), enriched by digital resources. Broadly, they comprise five vectors of competences: technical-informatic; technical-pedagogical; communication and collaboration; problem-solving; security; and digital citizenship [19], [20], [21], [22].

C. Digital Competence Frameworks for Educators

A pertinent issue highlighted in competence frameworks and research concerns the training of educators and the development of the digital competences necessary for the effective integration of digital technologies in learning contexts. This awareness of digital competence training has been driven by the policies of major international organisations and institutions, such as the OECD, UNESCO, and the European Union, which aim for a paradigmatic shift in education.

For this study, three frameworks were selected: (i) the ISTE Standards for Educators [19]; (ii) the UNESCO ICT Competency Framework for Teachers [20]; and (iii) DigCompEdu from the JRC [21]. These frameworks were chosen due to the relevance and importance that these organisations play in relation to education and the impact their recommendations can have on educational policy and the training of educators in Member States.

ISTE - Competence Standards for Educators

The ISTE Standards for Educators aim to establish digital competence standards to "guide educator practice, school improvement planning, professional development, and the design and implementation of new curricula" [19, p. 2]. Divided into four sections – Students, Educators, Educational Leaders, and Coaches – the competence section for Educators presents seven standards indicatives of their role as agents of change for student learning: (i) Learner; (ii) Leader; (iii) Citizen; (iv) Collaborator; (v) Designer; (vi) Facilitator; and (vii) Analyst. The educational processes proposed in this document include a new paradigm that anticipates innovation, disruption, and the evolution of teaching practices.

UNESCO ICT Competency Framework for Teachers

The ICT Competency Framework for Teachers consists of 18 competences organised around six areas of professional teaching practice, distributed across three levels of pedagogical ICT use: (i) Knowledge Acquisition; (ii) Knowledge Deepening; and (iii) Knowledge Creation. With three published versions (2008, 2011, and 2018), the framework aims to be dynamic, undergoing periodic revisions to ensure its relevance. The competences in Version 3 provide a "guide for effective ICT integration into teacher training programmes, adapting to the context of local and national needs" [20, p. 8]. Innovation with ICT, its potential and challenges, are guiding principles of this framework's orientations. Although briefly referenced rather than presented as competence standards, the document introduces innovations that should be present in school curricula.

European Framework for the Digital Competence of Educators (DigCompEdu)

DigCompEdu [21] is the result of research carried out by the Joint Research Centre (JRC) of the European Commission on Learning and Skills for the Digital Era. With over 120 different publications, DigCompEdu proposes a model for assessing and developing pedagogical digital competences, offering a common basis for these competences to European Union countries. Its objective is to encourage reflection on the development, comparison, and discussion of different tools for enhancing educators' digital competence. It is organised into three categories: (i) Professional Competences of Educators; (ii) Pedagogical Competences of Educators; and (iii) Competences of Learners. These are composed of six competence areas: Area 1 – Professional Engagement; Area 2 – Digital Resources; Area 3 – Teaching and Learning; Area 4 – Assessment; Area 5 – Empowering Learners; and Area 6 – Facilitating Learners' Digital Competence.1 These areas comprise a total of 22 specific competences designed to equip educators to harness the potential of digital technologies and innovate education.

The frameworks analysed seek to identify the digital competences that educators should possess to prepare students for the challenges of the future. These competences aim to provide teacher training that is better aligned with current educational needs, whether for face-to-face, distance, or blended learning.

III. Method

The present study aimed to (i) identify the conceptions of teaching competence in Distance learning studies and international digital competence frameworks, and (ii) characterise the main similarities and differences between these conceptions. To achieve this, a qualitative analytical and descriptive approachwas adopted [23], [24], [25]. The qualitative methodology was chosen because it allows for the in-depth exploration of conceptions of teaching competence in the context of distance learning, focusing on the analysis of meanings, patterns, and relationships present in academic texts and international frameworks. Data were collected from two primary sources:

(i) Academic literature: A selection of scholarly articles indexed in databases such as Scopus, Web of Science, and Google Scholar, published between 2005 and 2020, in Portuguese, English, or Spanish. The timeframe was established considering the consolidation of educational technologies in distance learning and the evolution of discussions on digital teaching competence during this period. As inclusion criteria, we established studies that specifically addressed teaching competences in Distance learning and works with theoretical or empirical approaches to teacher training for Distance learning. Based on these criteria, 9 articles were selected for analysis.

(ii) International digital competence frameworks for educators: Developed by the European Union, UNESCO, and ISTE. These frameworks were selected for their global relevance and applicability in defining competences for technology-mediated teaching.

Data analysis was performed using content analysis [26], employing an analytical grid for data categorisation. Initial categories were created based on the study's objectives and were refined as patterns emerged from the analysed data. This analysis led to a comparison between the categories identified in the academic literature and those in the international frameworks. The comparison focused on the similarities and differences between the conceptions of teaching competence present in both sources.

IV. Results

Upon analysing the specific competences for online lecturers in the selected articles, we observed that they address practical and specific aspects of the virtual teaching environment. Table 1 summarises the main competences

identified in the analysed scholarly articles, which emphasise the skills required for online teaching.

TABLE I. ONLINE LECTURER COMPETENCES

Competences	Description
Pedagogical	Mastery of teaching-learning methods and content.
Technological	Proficiency in e-learning tools.
Management and Coordination	Ability to organise and coordinate course-related activities and procedures.
Online Communication	Capacity to communicate effectively virtually with students, parents, and colleagues.

Created by the authors

While the competences identified in the academic articles are more geared towards the practical performance of online lecturers [9], [10], [11], [12], [13], [14], the international frameworks offer a broader and more structured perspective, emphasising preparation for the digital environment. It's noteworthy, for example, that these frameworks include aspects such as digital ethics and security, which do not explicitly appear in the specific literature on online teaching competences. They present a more comprehensive set of competences, geared not only towards online teaching but also towards the integration of digital technologies in education as a whole [19], [20], [21]. These competences are summarised in Table 2.

TABLE II. GENERAL COMPETENCES FROM THE FRAMEWORKS

Competences	Description
Communication and Collaboration	The ability to interact, share, and collaborate effectively through digital technologies.
Information and Data Literacy	Competence in Browse, searching, filtering, evaluating, managing, and interpreting digital information and data.
Media Literacy	Understanding how media is created, produced, and disseminated, and the ability to critically evaluate media content.
Digital Content Creation and Programming	The capacity to create and edit new content (including multimedia), integrate and rework previous content, and understand and apply basic programming concepts.
Safety	Protecting personal data and privacy, digital identity, security, and well-being, as well as being able to identify and respond to digital threats.
Intellectual Property	Understanding and respecting copyright and other intellectual property rights in the digital environment.
Problem-Solving and Critical Thinking	Identifying digital needs and resources, making informed decisions on which digital tools to use, and solving conceptual and technical problems through digital means.
Ethics	The transversal ethical consideration across all digital competences, promoting responsible and moral behaviour in the digital sphere.

Created by the authors

The categories presented in Tables 1 and 2 emerged from the content analysis of the documents, using the analytical grid described in the methodology. In the case of the scholarly articles, the coding revealed categories directly related to online teaching practice in Distance learning. For the international frameworks, the categories were identified based on the structuring principles of the analysed documents. This comparative analysis allowed us to observe that the general competence standards identified in the frameworks offer broad guidelines that can be adapted for specific contexts, such as the online teaching present in Distance learning. The combination of these standards with the specific competences for online lecturers, as analysed in the selected studies, creates a comprehensive set of competences that meets the requirements of contemporary digital education.

V. DISCUSSION

The findings of this study demonstrate that conceptions of teaching competence in Distance learning (DE) literature emphasise practical and operational aspects, while international frameworks adopt a more comprehensive approach, encompassing ethical, security, and digital citizenship dimensions. This complementarity suggests that teacher training for DE can benefit from both the pragmatic competences identified in the literature and the broader guidelines established by international frameworks.

Regarding the first objective of the study—(i) to identify the conceptions of teaching competence in DE studies and international digital competence frameworks—we found that academic literature tends to prioritise pedagogical communication, course management, and the use of technological tools to foster student interaction and engagement. In contrast, international frameworks also include cross-cutting competences such as digital ethics, cybersecurity, and digital literacy, dimensions that are less explicitly addressed in the analysed academic literature. From a global perspective, all these competences corroborate Mishra and Koehler's [16] proposals on the TPACK model, showing that teaching competences are not limited to technological mastery but demand a balanced integration of pedagogical and content knowledge.

As for the second objective—(ii) to characterise the main similarities and differences between the conceptions of online teaching competence and the digital competences presented in the studied frameworks—we identified the following key points:

Similarities

- Emphasis on Communication: Both academic literature and international frameworks recognise the importance of communication for facilitating online learning and promoting interaction and collaboration in digital environments.
- Adaptation and Updating: Both highlight the need for continuous professional development for educators, given the constant evolution of educational technologies.

Differences

- Focus on Teaching vs. General Competence: Teaching competences for online education are more geared towards the facilitation of virtual instruction, whereas international frameworks present a broader scope, applicable to diverse contexts.
- Depth of Skills: Digital competence frameworks demand a more in-depth approach in areas such as digital ethics, security, and media literacy, which are not always explored in equal detail within the literature on Distance learning.

The descriptive analysis conducted allowed us to conclude that the essential digital competences for an online lecturer transcend technical and pedagogical dimensions, also encompassing social and cultural competences. This finding aligns with Redecker's [21] studies on DigCompEdu, which

emphasise the importance of the ethical integration of technologies in teaching practice.

VI. Conclusions

The evidence gathered in this study indicates that the contemporary understanding of teacher competence in digital contexts must go beyond mere technological operation, incorporating a more holistic, ethical, and social perspective. Analysis of the literature on e-learning and international frameworks revealed that online teaching requires a balanced combination of pedagogical, technological and relational knowledge, as well as a critical awareness of the implications of teaching in a digital environment

As a contribution of this study, a set of 24 competences for the online lecturer was proposed, organised into eight fundamental dimensions (see Table 3). This framework seeks to integrate the specificities of online lecturing with global digital competence guidelines, promoting a more holistic approach to teacher training in digital contexts.

TABLE III. Digital Competences for the Online Lecturer

Competences	Description
Technical	1. Effective use of online learning platforms. 2. Integration of technological tools to enhance teaching. 3. Management and organisation of digital content.
Pedagogical	4. Online assessment and feedback. 5. Creation and adaptation of teaching materials for digital formats. 6. Effective online teaching strategies. 7. Availability to learn and incorporate emerging technologies.
Instructional Design	8. Designing courses for online environments. 9. Integrate multimedia resources effectively. 10. Personalising online learning experiences.
Communication and Collaboration	11. Promote and manage collaboration and engagement among students. 12. Develop virtual learning communities. 13. Communicate effectively in digital media.
Time Management and Organisation	14. Organise the course schedule and tasks. 15. Manage time and prioritise demands in digital environments.
Problem Solving and Data Management	16. Dealing with students' technical challenges. 17. Adapting to changes in online dynamics. 18. Management and pedagogical use of data.
Social and Cultural	19. Encourage student participation and collaboration 20. Create an engaging and ethical online community. 21. Recognise and value the cultural diversity of students.
Empowerment and Leadership	22. Empower and promote student agency. 23. Foster knowledge creation and co-creation. 24. Exercise leadership and digital educational management.

Created by the authors

These digital competences not only enhance the effectiveness of online teaching but also contribute to creating more inclusive, interactive, collaborative, and meaningful learning environments for students.

VII. Study Limitations

It's important to acknowledge some limitations of this study. Being a theoretical study, the findings require empirical validation in real-world teacher training contexts. Future research could apply this competence framework in teacher professional development programmes, utilising empirical methodologies such as interviews and questionnaires to assess its relevance and impact on pedagogical practice.

To address this limitation, we propose, as future research, the application of this competence framework with students enrolled in an online training course designed to prepare future educators for distance learning. This approach would allow for the evaluation of the implementation of the proposed competences and their impact on the pedagogical practice of trainee teachers.

References

[1] M. G. Moore e G. Kearsley, Distance education: a systems view of online learning, 3rd ed. Belmont, CA: Wadsworth Cengage Learning, 2012.

[2] L. Y. Covarrubias Hernández, «Educación a distancia: transformación de los aprendizajes», Telos: Revista De Estudios Interdisciplinarios En Ciencias Sociales, vol. 23, n.o 1, pp. 150–160, ago. 2021, Acedido: 4 de fevereiro de 2024. [Em linha]. Disponível em: https://ojs.urbe.edu/index.php/telos/article/view/3436

[3] L. S. C. D. Rosário e A. Moreira, «Competências do professor para o ensino online: análise de um curso de capacitação de docentes em EaD», Indagatio Didactica, pp. 116-131 Páginas, abr. 2019, doi: 10.34624/ID.V7I1.2626.

[4] P. O. of the E. Union, «Recomendação do Conselho, de 22 de maio de 2018, sobre as Competências Essenciais para a Aprendizagem ao Longo da Vida.» Acedido: 25 de julho de 2022. [Em linha]. Disponível em: http://op.europa.eu/pt/publication-detail/-/publication/6fda126a-67c9-11e8-ab9c-01aa75ed71a1/language-pt

[5] OECD, «Definition and Selection of Competencies (DeSeCo) - OECD». Acedido: 4 de fevereiro de 2024. [Em linha]. Disponível em: https://www.oecd.org/education/skills-beyond-school/definitionandselectionofcompetenciesdeseco.htm

[6] European Commission, «The Key Competences for Lifelong Learning – A European Framework». Publications Office of the European Union, 2006. [Em linha]. Disponível em: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_394/l_39420061230en00100018.pdf

[7] European Commission, «Uma nova agenda de competências para a Europa», 2017. [Em linha]. Disponível em: https://eur-lex.europa.eu/legal-content/PT/TXT/PDF/?uri=CELEX:52016IR4094&from=PT

[8] European Commission, «Plano de Ação para a Educação Digital (2021-2027) | European Education Area». Acedido: 1 de outubro de 2023. [Em linha]. Disponível em: https://education.ec.europa.eu/pt-pt/focus-topics/digital-education/action-plan

[9] J. Valadares, Teoria e prática de educação à distância. Lisboa : Universidade Aberta, 2011. Acedido: 4 de fevereiro de 2024. [Em linha]. Disponível em: https://bibliografia.bnportugal.gov.pt/bnp/bnp.exe/registo?1796122

[10] L. Tractenberg e R. Tractenberg, «Seis Competências Essenciais Da Docência Online Independente», em Anais eletrônicos, 2007. [Em linha]. Disponível em: https://aedi.ufpa.br/arquivos/leonel.pdf

[11] R. M. Palloff, K. Pratt, F. de S. Rodrigues, e R. Tractenberg, O Instrutor Online: Estratégias para a Excelência Profissional, 1a edição. Penso, 2013.

[12] G. Korkmaz e Ç. Toraman, «Are We REaDy for the Post-COVID-19 Educational Practice? An Investigation into What Educators Think as to Online Learning», IJTES, vol. 4, n.o 4, pp. 293–309, set. 2020, doi: 10.46328/ijtes.v4i4.110.

[13] F. Ferri, P. Grifoni, e T. Guzzo, «Online Learning and Emergency Remote Teaching: Opportunities and Challenges in Emergency Situations», Societies, vol. 10, n.o 4, p. 86, nov. 2020, doi: 10.3390/soc10040086.

[14] C. A. Vega Lebrún, M. Sánchez Cuevas, G. Rosano Ortega, e S. E. Amador Pérez, «Teaching skills, an innovation in virtual learning environments in higher education», Ap, vol. 13, n.o 2, pp. 6–21, set. 2021, doi: 10.32870/Ap.v13n2.2061.

[15] European Commission, COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Digital

Education Action Plan 2021-2027 Resetting education and training for the digital age. 2020. Acedido: 1 de outubro de 2023. [Em linha]. Disponível em: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0624

[16] P. Mishra e M. J. Koehler, «Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge», Teachers College Record: The Voice of Scholarship in Education, vol. 108, n.o 6, pp. 1017–1054, jun. 2006, doi: 10.1111/j.1467-9620.2006.00684.x.

[17] A. C. Loureiro, M. Meirinhos, e A. J. Osório, «COMPETENCE DEVELOPMENT FOR THE EDUCATIONAL INTEGRATION OF DIGITAL RESOURCES», apresentado na 13th International Conference on Education and New Learning Technologies, Online Conference, jul. 2021, pp. 11287–11296. doi: 10.21125/edulearn.2021.2353.

[18] A. C. Loureiro, M. Meirinhos, e A. J. Osório, «Competência digital docente: linhas de orientação dos referenciais», Texto Livre, vol. 13, n.o 2, pp. 163–181, jul. 2020, doi: 10.35699/1983-3652.2020.24401.

[19] ISTE, «Standards. International Society for Technology in Education». Acedido: 11 de julho de 2022. [Em linha]. Disponível em: https://cdn.iste.org/iste-standards

[20] UNESCO, «ICT Competency Framework for Teachers». Unesco Digital Library, 2018. Acedido: 11 de julho de 2022. [Em linha]. Disponível em: https://unesdoc.unesco.org/ark:/48223/pf0000265721

[21] C. Redecker, «European Framework for the Digital Competence of Educators: DigCompEdu», Joint Research Centre (Seville site), JRC107466, nov. 2017. Acedido: 27 de julho de 2022. [Em linha]. Disponível em: https://ideas.repec.org/p/ipt/iptwpa/jrc107466.html

[22] R. Vuorikari, S. Kluzer, e Y. Punie, «DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes», JRC Publications Repository. Acedido: 4 de fevereiro de 2024. [Em linha]. Disponível em: https://publications.jrc.ec.europa.eu/repository/handle/JRC128415

[23] A. J. da S. Barros e A. J. da S. B. e N. A. de S. Lehfeld, Fundamentos de metodologia científica, 3rd edition. Pearson, 2012.

[24] K. A. Neuendorf, The Content Analysis Guidebook. SAGE, 2017.

[25] J. Staddon, Scientific Method: How Science Works, Fails to Work, and Pretends to Work, 1st edition. Routledge, 2018.

[26] L. Bardin, Análise De Conteudo. Almedina, 2008.