

Digital competence analysis to inform current pedagogy and curricula

Análisis de la competencia digital para informar la pedagogía y los currícula actuales

Anàlisi de la competència digital per informar la pedagogia i els currículums actuals

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1. INTRODUCTION

The importance of DCs (digital competences) at all levels of education is evident, given the extensive literature, international legislation, projects, and pedagogical resources emerging and developing over the past decade. Therefore, DC frameworks for different types of educational contexts have been proposed. For example, DigCompEdu (“European Framework for the Digital Competence of Educators”, [Punie & Redecker, 2017](#)) has been widely accepted and adapted to different academic areas and geographical regions (e.g., in Spain, see [Mora-Cantallos et al., 2022](#)). According to these guidelines, DC formation in education includes various developmental sections and aspects (e.g., digital creation, online assessment, student empowerment, and so on), which teachers can check for self-reflection and critical thinking. Given the criteria established, different levels of expertise can be inferred according to competence variables, and, based on these, educators can work towards improving one aspect or another in the DC spectrum.

Nonetheless, despite this established framework of digital skills in education, there is a need for more contrastive analyses of actual DC developments in cross-disciplinary and cross-curricular ecologies: How current pedagogical approaches may vary within an exponentially growing digital world is, in fact, a key issue deserving further scholarly attention at various research dissemination levels.¹ A fair question, then, to ask is whether the post-pandemic era is witnessing significant DC developments and changes across the curriculum, and if so, to what extent. Also, related to this concern, is the lingering question of how digitally competent educators and learners really are in formal and informal teaching/learning scenarios? Further, how may pedagogy-informed decisions be made and integrated into current policies, projects, and planning in an era where technology should have become so familiar that it is invisible (cf. [Bax, 2003](#))?

¹ Despite an increase in pedagogy-focused investigations, the reality is that a wide gap still exists between researchers’ reflections and the teaching community’s actual practices, as observed in different meta-analyses (e.g., [Sato & Lowen, 2022](#); [Boulton & Vyatkina, 2024](#)).

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During the pandemic, an increased use of digital resources was seen, leading pedagogy experts to focus on educational policies and programmes for DC integration in curricula across geographical areas (e.g., [Ganimian et al., 2020](#); [McGarr et al., 2021](#); [Selfie for teachers, 2022](#); Arcón & Monje, this special issue). This implementation of digital practices, often attempting to quell rising anxiety and fears related to decreased educational levels due to COVID, resulted in both successful and failed scenarios for learning, whereas it could also contribute to the ever-increasing digital divide between regions and social classes / groups (e.g., see [Gómez Trigueros & Yáñez, 2021](#); [Castelo Branco et al., 2022](#); [Viscarret et al., 2022](#)). As a result, a re-consideration of DCs, their definition, and description for curriculum design, are manifestly important nowadays. A recent case is the need for regulating and framing GenAI resources and practices in all types of academic / educational environments, entailing a (re)formulation of DC mechanics, objectives, purposes, and implementation (e.g., see [Dwivedi et al., 2023](#); [Fleckenstein et al., 2024](#); [Lan & Chen, 2024](#)).

2. DIGITAL COMPETENCES TO INFORM PEDAGOGY AND CURRICULUM DESIGN

The integration of DCs in pedagogy and curricula thus requires institutional and legislative support as well as an adequate advancement of educators' and students' training into rapidly evolving models of digital teaching / learning. A key concern here is the development of strategies that enable effective methods of teaching, learning and immersion into a culture of technology-enhanced curricula ([Chun, 2019](#)). Also, educators need to recognize the usefulness of the affordances of online resources for course development because these can actually help them to achieve specific curriculum objectives. DCs can thus be treated as part of the overarching framework of cross-disciplinary and transversal skills needed and/or recommended according to evolving academic and professional ecologies (from primary to tertiary education). Likewise, as teachers and students realize the positive effects of these DC developments in their daily tasks, more technology-enhanced skills can be activated and framed within curricula, leading to greater inclusion and integration regardless of the learning cultural scenario, its geographical location, and/or socio-economic traits, as [Darvin \(2019\)](#) postulates.

In this scope, this special issue presents five action-research studies which can illustrate insightful perspectives and approaches to the what's and how's of DC developments for DC integration within current educational directions. The shared objective in these studies is thus to provide updated and practical descriptions / accounts of DCs in education so that pedagogical reflections, based on empirical information, can enrich educational curriculum approaches. For example, communicative competences such as reading and writing can be re-assessed across disciplines and according to objectives that involve working with specific skills. Likewise, project-based competences can be framed within a scope which prioritizes the learning process using digital strategies, and where educational stakeholders become pivotal references for knowledge sharing and feedback.

Within these guidelines, a first study in this special issue is presented by Alejandro Curado-Fuentes about reading comprehension, where students' reading competence in English is found to improve when digital tools are used, and yet, using these digital tools is not always a guarantee for learning success. An example is that one of the groups of learners in the study showed a deficient use of the text-analytical tools, finding them ineffective and discouraging, compared to other resources for reading and vocabulary gain. In contrast, greater learning progress occurred when micro-skills were aptly integrated (e.g., noticing, sharing, and inducing linguistic and content meaning online). A main conclusion is that the use of DCs demands critical

thinking, and resources and pedagogy should be adapted according to the specific learning variations observed in the academic context and/or professional career in order to inform and update university curricula.

The second study is presented by Paz Díez Arcón and Elena Martín Monje, who focus on the evaluation of a large number of student-teachers' self-perception values and ideas regarding their mastery of DCs and didactic competences, analysed in a holistic approach to curriculum design. The authors examine significant pointers to the intrinsic critical thinking and reflection made by participants, leading to self-perception differences along developmental stages. Thus, the authors found that DCs are generally valued as significant in accordance with task experience and collaborative work, and yet, DCs are overestimated at first by students. In contrast, didactic competences, albeit perceived as having improved less at the end of the module, are mostly considered crucial in the development of DCs. These observations corroborate the importance of integrating different competences in educational curricula when DCs are tackled.

In the third article, authors Yolanda Deocano-Ruiz, Laura Alonso Díaz, and Gemma Delicado-Puerto analyse the different existing legislative efforts, policies, frameworks, and projects aimed at an active involvement with DCs. They thus examine various educational, social, and cultural scenarios in Spain and Europe. This scrutiny is done qualitatively by means of content analysis, collecting data via a descriptive matrix, in order to determine whether the objectives related to digital formation, outlined in the European 2030 Agenda, are being met. Findings point to a partial fulfilment of DC criteria in relation to various plans and projects, whereas some key developmental goals still need to be tackled and implemented in terms of digital citizenship resources, regional issues, and globalized/glocalized scopes. Therefore, it may be concluded that, even if a lot of legislative effort is made, a fluent, integrated adaptation of DCs must be based on collective processing at different socio-cultural and economic stages.

The fourth paper, by Mercedes Rico and Laura Fielden, examines the affordances of combining semiotics and digital storytelling through the experiential framework of Kolb. For this classroom study, technical degree students were taught semiotics. First, learners were trained in basic semiotics and specialised terms, reading and interpreting cartographic symbols with different cultural dimensions. Then, the classes were divided into: 1) A control group, who further interpreted existing digital maps, and 2) an experimental group, who created their own thematic digital maps to tell a "geo-story". The findings point to the experimental group's significantly increased use of specific vocabulary and terminology. Additionally, digital map creation revealed a deeper understanding of cultural symbolism in map interpretation. It is concluded that DCs, if used creatively, lead to more positive learning outcome than if used less dynamically. This observation corroborates the importance of a procedural DC-focused analysis for curricular design.

Finally, the fifth study, presented by Adriana C. Lara Velarde, explores DCs in the context of fluency for mediation development. This competence is key in online environments, as devised in the European/Spanish digital frameworks mentioned earlier. In this case study, the author works with several learners, conducting mediation tasks via face-to-face and online sessions. The results show that students performed better in online environments, where they produced more straightforward and comprehensible messages, demonstrating fewer pauses and more communicative integrity, than in face-to-face sessions. Then, students explicitly indicated, via interviews, that they felt more pressured and externally judged in face-to-face interactions. One chief conclusion is that this DC should be favoured and integrated further in educational curricula because it can cope with individual learning differences along the curricular path.

3. CONCLUSION

The integration of DCs in education seems to imply a paradigm shift, since innovative developments can enhance and / or modify curricular directions. Disciplinary/ academic literacies, socio-cultural competence, and curricular content can coherently converge by means of updated pedagogical practices involving DCs. Embracing innovative pedagogical approaches can be thus associated with leveraging technologies, and educators can empower learners to thrive in a digitally mediated world if educational curricular directions address the effective implementation of DCs at all levels. It can be deduced that the transformative potential of DCs can catalyse equitable access to learning developments for all, provided that these DCs are adequately defined and promoted on individual and collective scales. As shown in this special issue, DC developments can favour the implementation of more specific learning approaches tailored to different types of student needs and preferences.

A key affordance is the facilitation of student engagement via active participation and collaboration. With the emergence of GenAI technologies, this aspect is even more relevant today. Students must understand and assimilate the benefits of working with these digital media for developing skills online such as critical thinking and contrastive analysis. In this process, students can experience the positive impact of insightful interventions made by educational stakeholders (not only teachers but also peers and the overall community), which generally lead to significant learning. Nonetheless, for all these features to converge, one important aspect is that the teaching staff count on suitable knowledge and / or digital skills. Today, training teachers in DC developments actually requires on-going in-depth exploration and implementation.

In sum, DCs can truly broaden the educational spectrum. The key is to use digital resources sensibly and productively in catering to diverse learning preferences, values, and interests. Strengths and weaknesses can be thus detected in teaching and learning strategies / interventions with DCs, enabling the optimization of methodological mechanisms that address educational curriculum constraints and limitations. This way, DCs can empower educators and educational institutions, and the collection, analysis, and application of DC evidence can inform curricular decision-making as well as improve instructional practices.

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