Self-Assessment of Digital Competence for Educators: a Brazilian Study with University Professors

Autoavaliação das Competências Digitais dos Professores: um Estudo Brasileiro com Docentes Universitários

Autoevaluación de las Competencias digitales del profesorado: un estudio Brasileño con profesores universitarios

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Abstract
Educators' digital competence is essential for the promotion of teaching strategies concatenated with the digital society's demands. The aim of this study is to analyze the digital competence of 39 university professors in Santo Amaro, Bahia State, Brazil, pointing out formation paths for development of educational practices able to promote learning in digital environments. It is configured as an exploratory and descriptive research, with a quantitative approach, using the self-assessment scale from Digital Competence of Educators (DigCompEdu). Out of the 39 responding university teachers, 18 were of the female gender (46.2%) and 21 male gender (53.8%), with ages varying between 25 and 62 years. The results related to the different scopes revealed a mean value (44 points) that locates the participating educators in level B1 (integrator), close to level B2 (which begins with 48 points). The professors surveyed revealed gaps at the digital competence related with the role of the online reflective practice; application of digital technologies in the teaching and learning process and assessment practices with the support of digital technologies; indicating the need for continuing professor education in order to mitigate the evidenced gaps.
Keywords: Digital competence of educators; DigCompEdu; Digital technologies; Higher education; Teaching.

Resumo
A competência digital dos educadores é essencial para a promoção de estratégias de ensino concatenadas com as demandas da sociedade digital. O objetivo deste estudo é analisar a competência digital de 39 professores universitários em Santo Amaro, Estado da Bahia, Brasil, apontando-lhes caminhos de formação para o desenvolvimento de práticas educativas capazes de promover a aprendizagem em ambientes digitais. Configura-se como uma pesquisa exploratória e descritiva, com uma abordagem quantitativa, utilizando a escala de autoavaliação da Competência Digital dos Professores (DigCompEdu). Dos 39 professores universitários que responderam, 18 eram do gênero feminino (46,2%) e 21 do gênero masculino (53,8%), com idades que variam entre os 25 e 62 anos. Os resultados relacionados com os diferentes níveis de competências revelaram um valor médio (44 pontos) que situa os educadores participantes no nível B1 (integrador), próximo do nível B2 (que começa com 48 pontos). Os professores investigados revelaram lacunas na competência digital relacionadas com o papel da prática reflexiva *online*; aplicação das tecnologias digitais no processo de ensino e aprendizagem e práticas de avaliação com o apoio das tecnologias digitais; indicando a necessidade de formação continuada, a fim de mitigar as lacunas evidenciadas.
Palavras-chave: Competências digitais dos professores; DigCompEdu; Tecnologias digitais; Educação superior; Ensino.

Resumen
La competencia digital de los educadores es essencial para la promoción de estrategias de enseñanza concatenadas con las demandas de la sociedad digital. El objetivo de este estudio es analizar la competencia digital de 39 profesores universitarios de Santo Amaro, Estado de Bahía, Brasil, señalando caminos de formación para el desarrollo de prácticas

educativas capaces de promover el aprendizaje en entornos digitales. Se configura como una investigación exploratoria y descriptiva, con un enfoque cuantitativo, utilizando la escala de autoevaluación de la Competencia Digital del Profesorado (DigCompEdu). De los 39 profesores universitarios que respondieron, 18 eran de género femenino (46,2%) y 21 de género masculino (53,8%), con edades que oscilaban entre los 25 y los 62 años. Los resultados relacionados con los diferentes niveles revelaron un valor medio (44 puntos) que sitúa a los educadores participantes en el nivel B1 (integrador), cercano al nivel B2 (que comienza con 48 puntos). Los profesores encuestados revelaron lagunas en la competencia digital relacionadas con el papel de la práctica reflexiva en línea; la aplicación de las tecnologías digitales en el proceso de enseñanza y aprendizaje y las prácticas de evaluación con el apoyo de las tecnologías digitales; indicando la necesidad de la formación continua para mitigar las lagunas evidenciadas.
Palabras clave: Competencias digitales del profesorado; DigCompEdu; Tecnologías digitales, Educación superior; Enseñanza.

1. Introduction

The increasing insertion of Digital Information and Communication Technologies (DICT) in education has promoted new forms of teaching and learning practices at all levels of education. Thereby, in the face of a hyperconnected generation that moves in a smooth and hybrid manner both virtually and in the classroom, imposes to the educators the development of digital competences with the aim of using DICT to attain the desired pedagogical objectives, avoiding the mere didactical transposition of the activities performed in the classrooms to virtual environments.

It should be observed that social isolation, imposed by the Covid-19 pandemic, hurled the educators to cyberspace, obliging them to abruptly develop minimum digital competences necessary for teaching online (Decuypere, Grimaldi & Landri, 2021; OCDE, 2021). In this context, it falls upon the educators to understand how to use digital technologies to create sustainable learning scenarios, promoting educational strategies that contemplate the insertion of DICT in motivating and creative settings, using digital tools that are part of the students' routines (Silva & Behar, 2022; Cabero-Almenara et al., 2020; Díaz, 2019).

This study has the purpose of analyzing the main digital competences of a sample of educators working in Santo Amaro, Bahia, Brazil, as preconized in the DigCompEdu model, in order to identify the level of digital competence of these educators and indicate training programs for the development of educational practices, promoting the learning practices and autonomy of the students.

An exploratory and descriptive study, of a quantitative approach, presented as data collection procedure a survey in the format of an online questionnaire. The Brazilian version of the Digital Competence Framework for Educators scale (DigCompEdu) was used, based on a model developed by the EU Science Hub and structured in Brazil by the Collaborative Learning Network (*RCA - Rede Colaborativa de Aprendizagem*).

2. Theoretical Framework

With the growing development of the DICTs, educators have sought new strategies for developing innovative, sustainable learning environments adapted to the emerging profile of the students, in other words, true digital nomads, hyperconnected and who move in a smooth and hybrid manner through different spaces, either in-person or virtually.

However, it is not about the mere insertion of the DICTs in the educational process, but, most importantly, to perceive how this technology may be used to reach the desired objectives, that is to say, reaching a level of digital fluency. In effect, both educators and students need to learn how to use the digital platforms and environments, making use of different digital technological resources, mainly those associated with the mobile devices that are part of the daily lives of the students.
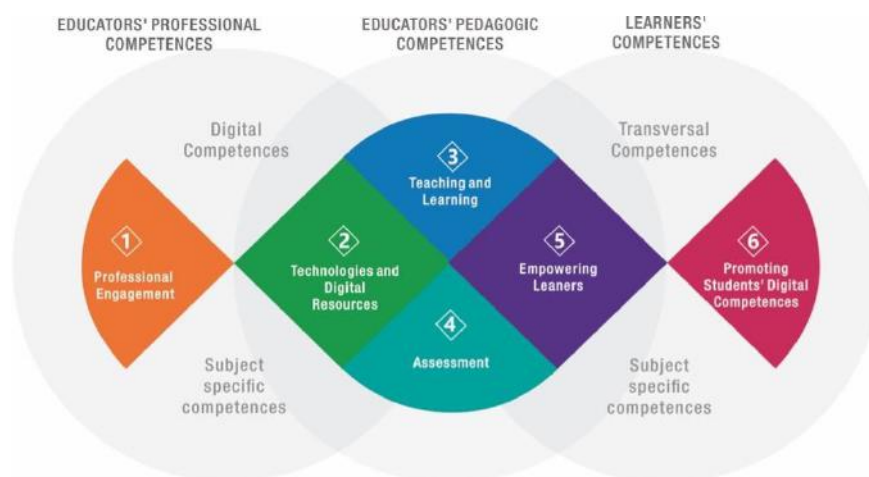
In line with the United Nations' 2030 Agenda (United Nations, 2015), when defining the essential learning that all students must develop throughout the basic education stages and modalities, the Brazilian Common Core Curriculum (*BNCC – Base Nacional Comum Curricular*) establishes that pedagogical decisions must be based on the development of competences through the selection, production, application and assessment of didactical and technological resources supporting the teaching and learning process, in order that students are capable of critically using the DICTs "in sundry social practices (including school

practices) to communicate, access and disseminate information, produce knowledge, solve problems and exercise leadership and authorship in their personal and collective lives" (Brazil, 2017, p. 9).

The integration of digital technologies to the education system and, more specifically, the development of digital educational ecosystems, enables the use of the advantages associated to the technologies to be applied in the education process, perceived by different authors as motivational and promoting diversified, hybrid, fertile and dynamic environments, fostering an increasingly comprehensive education (Silva et al., 2022; Garcez et al., 2022; Dias-Trindade & Moreira, 2018; Ferrari et al., 2012).

In this respect, the challenge is not only in the integration of digital strategies in the classroom or online classes but, above all, in the knowledge of how to use it in such a manner as to permit the development of emancipatory competences, in other words, collaborating towards the development of an active sense of belonging of the young students, both within their educational community as well as, later on, in their professional lives, as per Figueiredo (2016). According to Dias-Trindade & Moreira (2017), the challenge is in understanding how to use technology "to transform education into a normal daily activity, even when it is not recognized as being a learning process" (p. 55).

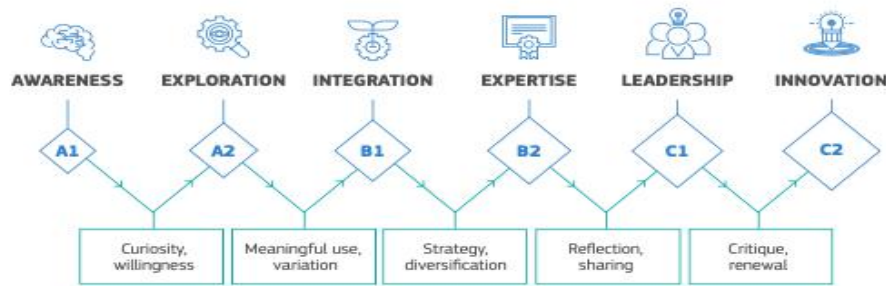**Figure 1:** Areas and scope of the digital competence of educators.

Source: Dias-Trindade et al., (2019), adapted from Redecker (2017).

In this context, the EU Science Hub has aimed to identify the needs of educators in the level of digital competence, through the preparation of questionnaires, analyses and reports that support the work to be developed in this area. Among the different products developed, the DigCompEdu is of particular interest, a report presenting a common digital competence framework for educators, issued in 2017, considering that educators require a set of specific digital competences for the teaching practice, designed to build on innovative potential of the DICT in the educational process (Redecker, 2017).

At the same time, the DigCompEdu team developed an online questionnaire, with the collaboration of various countries, to identify the level of digital competence of educators and, further than just cataloging a set of competences, supply a report with suggestions for improvement of the educational practices in the areas and dimensions evidenced under Figure 1.

As a result of the self-assessment performed on the DigCompEdu online questionnaire, the educators are set-up in a scale of 6 (six) levels reflecting their degree of digital competence, as evidenced under Figure 2.

Figure 2: Digital Competence of Educators levels by DigCompEdu Framework.

Source: Redecker (2017).

The self-assessment proposed by DigCompEdu has become highly relevant once it permits the definition of the level of digital competence of each educator and, above all, to understand how to evolve to the following levels, towards obtaining digital fluency. Furthermore, the framework outlines six different stages through which questionnaire permits us to verify the levels for each of the six areas of competence and, thus, measure the type of development best adequate for each educator, i.e., which areas require further investment, and those that are closer to a level of fluency (Dias-Trindade & Ferreira, 2020; Mattar et al., 2020).

In the levels of digital competence named as Newcomer (A1) and Explorer (A2) the educators assimilate new information and develop basic digital practices. In the intermediate level there are the Integrator (B1) and Expert (B2), educators apply, further expand and structure their digital practices. Finally, at the highest stages are the Leader (C1) and Pioneer (C2), in other words, those that pass on their knowledge, critique existing practice and develop new practices, as clarified by Redecker (2017). Also, as Basilotta-Gómez-Pablos and colleagues (2022) have pointed out, to understand teachers' training needs it is necessary to start by identifying the starting point.

Dias-Trindade et al. (2020) applied the DigCompEdu self-assessment scale with a sample of 118 educators of a Portuguese University, revealing a mean value that placed the educators at the intermediate level, called Integrator (B1), namely they experiment with digital technologies in a variety of contexts and for a range or purposes, integrating them into many of their practices. Furthermore, they creatively use them to enhance different aspects of their professional engagement and are eager to expand their repertoire of practices. Nevertheless, they need some more time for experimentation and reflection, complemented by collaborative encouragement and knowledge exchange to become Experts (B2).

3. Method

The study presents a quantitative approach and for the definition of the operational typology, the Marconi & Lakatos (2022) concepts were adopted, classifying it as an exploratory and descriptive study using as data collection procedure a survey in the format of a questionnaire, accessed through an online platform structured in the environment of the Brazilian Collaborative Learning Network (RCA).

The questionnaire used was a Brazilian version of the DigCompEdu scale framework developed originally by the EU Science Hub. The questionnaire comprised 21 (twenty-one) questions, constituting a self-assessment tool, contemplating a competence model for educators at all levels of education, from kinder-garden to higher education, whereby the digital competence of the educators is subdivided into 6 (six) different areas.

Dias-Trindade, Moreira & Nunes (2019) performed a statistical study to validate the DigCompEdu questionnaire in the Portuguese language, considering the analysis of its internal consistency through the calculation of the Cronbach's alpha coefficient and Construct validity analysis (factorial exploratory and confirmatory analysis), revealing fully satisfactory internal consistency indicators.

The questionnaire was applied in the first semester of 2020, in a universe of 76 Brazilian professors from the Center of Culture, Language and Applied Technologies (CECULT) of Federal University of Bahia's Reconcavo (UFRB), Campus Santo Amaro, Bahia State, Brazil, where 39 (51.3%) valid responses were obtained that are part of the sample of this research.

With the aim of fulfilling the resolutions of the Brazilian Commission for Ethics in Research (CONEP), that rules scientific research with human participants in Brazil, the research was submitted and approved by the Research Ethics Committee (CEP), report number 358241.

4. Findings and Discussions

The DigCompEdu research instrument was applied between February and July, 2020. Out of the 39 responding educators, 18 were of the female gender (46.2%) and 21 male gender (53.8%), with ages varying between 25 and 62 years. The results related to the different scopes revealed a mean value that locates the participating educators in level B1 (integrator), once the average obtained was of 44 points (in a maximum of 84), however close to level B2 (which begins with 48 points). According to Redecker (2017) this level means that the respondents have the following characteristics:

> Integrators experiment with digital technologies in a variety of contexts and for a range of purposes, integrating them into many of their practices. They creatively use them to enhance diverse aspects of their professional engagement. They are eager to expand their repertoire of practices. They are, however, still working on understanding which tools work best in which situations and on fitting digital technologies to pedagogic strategies and methods. Integrators just need some more time for experimentation and reflection, complemented by collaborative encouragement and knowledge exchange to become Experts (p. 30).

As it is possible to observe in Table 1, area four (assessment) is the one that presents lowest mean value (framed in level A2) and area 6 (promoting students' digital competence) presents the highest mean value, despite being within level B1, as the remaining areas.

This data is directly related to the definition presented for level B1, integrator, in other words, professionals that use digital technologies, but that still need to work on understanding, above all, on fitting digital technologies to their objectives, strategies and methods. It seems they still need to understand how to work collaboratively to best apply in different moments the different possibilities of digital technologies.

Upon specific observation of the results of each of the competences presented under Table 1, those with the lowest levels were:

Item 2 – Reflective practice – 1.72 points;

Item 10 – Active engagement of learners – 1.38 points;

Item 12 – Self-regulated learning – 1.67 points.

These results demonstrate difficulties in the two initial scopes of this benchmark. In the first scope and considering the results of item 2 (reflective practice), the participating educators manifest some weakness regarding an awareness that it is necessary to be in constant development, in constant search for broadening knowledge, especially considering the rapid evolution of digital technologies.

Item 10 (actively engaging learners) leads us to the capacity of using digital technology for the students to be actively involved in their learning process through the creation of activities adapted to their specific needs. Furthermore, the development of transversal skills should be fostered, relating what is learned in the educational spaces with what will be necessary for the students to succeed in their professional lives and in exercising their citizenship.

Table 1: Average results in the 21 competences of the DigCompEdu.

Dimension	DigCompEdu area	Digital competence item	Average score	Rating
Educators' professional competences	Professional Engagement	1. Organizational communication	2.38	Average
		2. Reflective Practice	1.72	Poor
		3. Digital competences	2.31	Average
		4. Selection	1.90	Poor
	Technologies and Digital Resources	5. Professional collaboration	1.82	Poor
		6. Management, protection and sharing	2.38	Average
Educators' pedagogic competences	Teaching and Learning	7. Teaching	1.85	Poor
		8. Orientation	2.38	Average
		9. Collaborative learning	2.23	Average
		10. Active engagement of learners	1.38	Very poor
		11. Content creation	2.46	Average
	Assessment	12. Self-regulated learning	1.67	Very poor
		13. Evaluation strategies	1.82	Poor
		14. Feedback and planning	2.26	Average
	Empowering Leaners	15. Evidence analysis	1.82	Poor
		16. Accessibility and inclusion	2.51	Good
Learners' competences	Promoting Students' Digital Competences	17. Activities suited to the learners	2.26	Average
		18. Information and media literacy	2.51	Good
		19. Internal/external communication	2.18	Average
		20. Responsible online behavior	1.77	Poor
		21. Problem solving with technologies	2.08	Average

Note: rating scale: Good - above 2.5 points; average, between 2.49 and 2.0 points; poor, between 1.99 and 1.70 points; very poor, below 1.70 points. Source: Authors.

The results obtained in item 12 (self-regulated learning), on the other hand, is framed in the second scope (educators' pedagogic competences), area 4 (assessment), demonstrating that the researched educators need to develop more competences at the level of promoting diversified assessment approaches and, above all, adequate to the different moments of the learning process. In this regard, they need to use digital technologies to accompany the progress of the students, offering them the necessary feedback so they can plan their studies, monitor their progress and reflect on their own learning process.

Different authors state that the gaps noted reveal the need for the implementation continuous professional development programs for educators in digital technology, with a didactical design contemplating learning trails addressing the following key matters (Santo, Lima & Oliveira, 2021; Choi, Chung & Ko, 2021; Fraile, Peñalva-Vélez & Mendióroz Lacambra, 2018; Albion et al., 2015):

a) Role of the online reflective practice and its need for continuous professional development;

b) Application of digital technologies in the teaching and learning process, with the aim of promoting the active engagement of learners;

c) Process assessment practices with the support of digital technologies, with special attention to providing timely and targeted feedback during the teaching and learning process.
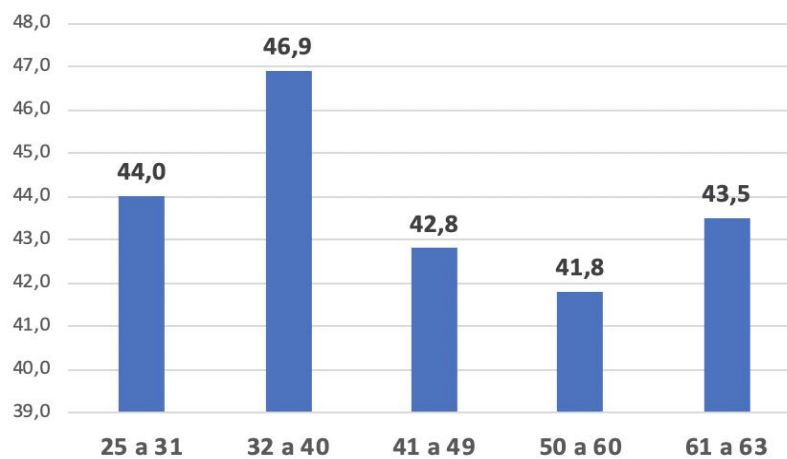
The digital competences of the researched educators presenting highest scores are:

a) Item 11 – Content creation – 2.46 points;

b) Item 16 – Accessibility and inclusion – 2.51 points;

c) Item 18 – Information and media literacy – 2.51 points.

These items, despite being from different areas, are aligned once they all refer to the creation and preparation of content, even when in different moments or with different protagonists. Item 11 (content creation) falls under area 3 (teaching and learning), focusing attention on the creation of content by the educator, creating from zero or knowing how to reutilize existing resources when permitted. However, as established for item 16 (accessibility and inclusion), these same resources must be created considering the needs of the learners and their accessibility. Finally, item 18 (information and media literacy) aims to verify whether the learners are able to use digital media for communication among themselves or with the external public, incorporating activities and assessment where the learners develop competences for searching, critical assessment and selection of resources, information and sources.

The results were also analyzed by age group, once it is often commented that the higher the age group the lesser is the digital competence (Graph 1).

Graph 1: Results obtained by age group.

Source: Authors.

Nevertheless, and as stated in other studies performed by Dias-Trindade and Moreira (2018); Dias-Trindade et al., (2020), the results of this study corroborate, once again, that there is no correlation between age group and digital competence. As evidenced in Graph 2, the investigated educators in the age group of between 50 and 60 and 61 and 63 presented mean values of between 41.8 and 43.5 points, respectively, classifying them in the same level as the others, i.e., Level B1 (integrator).

Wang et al. (2012), on the other hand, indicate that there is a whole set of variables (such as predisposition, accessibility, among others) that explain the existence of a continuum, instead of a rigid dichotomy among the so-called digital natives or immigrants.

5. Conclusion

The context of the pandemic and social isolation as a result of Covid-19 imposed to educators the acceleration of the development or improvement of digital competence, considering that with the interruption of classroom education the educators were hurled into online education, using the potential of digital technology in the teaching and learning process.

In this respect, based on the DigCompEdu framework we analyzed in this study the digital competence of 39 university professors working at the UFRB Campus in Santo Amaro, Bahia, Brazil. It was verified that the researched educators come under Level B1, called integrators, in other words, they experiment with digital technologies in a variety of contexts and for a

range of purposes, however they still aim to understand which technologies and strategies are most appropriate to the educational context.

Based on the 21 competences of the DigCompEdu model, the investigated educators in the sample demonstrated greater gaps in items related to reflective practice, active engagement of learners and self-regulated learning. The competences presenting the highest scores were those related to content creation, accessibility and inclusion, and information and media literacy.

These results, when compared to the findings obtained in similar studies (Dias-Trindade; Moreira & Ferreira, 2020), evidenced the importance of each educator in an institution answering the questionnaire in order for the institution to adapt training in accordance with the actual needs of its educators. Despite both studies presenting mean values within level B1 (integrator), each institution reveals different training requirements (for example, in the study of the Portuguese researchers, Area 6 was the one presenting greater weakness, while the results of the research presented herein, this area presented the best mean values).

In order to address the gaps verified in the digital competence of the researched educators, the implementation of continuous professional development programs in digital technologies for educators is considered pertinent to the didactic design of the learning-teaching process, promoting the active engagement of learners and, ultimately, the development of process assessment practices with the support of digital technologies process assessment practices with the support of digital technologies (Santo et al., 2021; Choi et al., 2021; Fraile et al., 2018).

This study provided disquieting challenges for the development of digital competence and fluency of the investigated university educators, indicating gaps requiring attention for their continuous professional development. The pressing need towards advancing to improved digital competence is perceived in order for educators to be prepared to operate within a digitally hyperconnected society.

Future studies correlating the implementation of professional development programs for educators in the evidenced gaps and its impact in the digital competence of educators are very welcome.

Acknowledgments

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