Birleşik Dünya BD CENTER Yenilik Araştırma ve Yayıncılık Merkezi

World Journal on Educational Technology: Current Issues

World Journal on Educational Technology: Current Issues 2009

Volume 17, Issue 3, (2025)

www.wj-et.eu

Profiling competences for the development of digital citizenship in teacher education

Chaimae Tnibar-Harrus, University of Granada, Faculty of Education, Economy and Technology of Ceuta, Ceuta No. 51001, Spain, chaimae@ugr.es, ORCID https://orcid.org/0009-0005-3812-8012
María José Latorre-Medina*, Univeristy of Granada, Faculty of Education, Economy and Technology of Ceuta, Ceuta No. 51001, Spain, mjlator@ugr.es, ORCID https://orcid.org/0000-0003-2237-9341

Suggested Citation:
Tnibar-Harrus, C. & Latorre-Medina, M.J. (2025). Profiling competences for the development of digital citizenship in teacher education. *World Journal on Educational Technology: Current Issues*, *17*(3), 158-169. https://doi.org/10.18844/wjet.v17i3.9441

Received on January 3, 2025; revised on April 12, 2025; accepted on June 08, 2025.
Selection and peer review under the responsibility of Prof. Dr. Huseyin Uzunboylu, University of Kyrenia, Cyprus.

Abstract

The aim of this study is to identify the level of digital competence of future teachers of Early Childhood Education and Primary Education, following the specifications advanced by the European Digital Competence Framework for Citizens. In this case, a quantitative methodology was carried out, using an *ad hoc* questionnaire entitled 'Competences for the Development of Digital Citizenship in Initial Teacher Training'. The results reveal the presence of two groups of competent profiles among the future teachers who participated. On the one hand, we find a group of future teachers whose status is moderate and sufficient to, for example, create individualized digital contents and, on the other hand, there is a group of future teachers with an outstanding and excellent levels concerning issues of digital accessibility. In fact, the findings also indicate that the members of this group excel in techno-pedagogical matters (incorporating pictograms, subtitles, etc.). It is also observed that the performance of both groups is remarkable, with notable strengths in their performance levels when it comes to collaborating online, applying basic safety guidelines, rationalizing the use of devices and solving technical problems. In any case, the trend of the levels of competence is growing and should be subsequently bolstered in initial teacher training programmed for the European Higher Education Area.

Keywords: clustering; cyber skills; educational technology; online participation; virtual citizens

* ADDRESS FOR CORRESPONDENCE: María José Latorre-Medina, University of Granada, Faculty of Education, Economy and Technology of Ceuta, Ceuta, Spain.
E-mail address: mjlator@ugr.es

Tnibar-Harrus, C. & Latorre-Medina, M.J. (2025). Profiling competences for the development of digital citizenship in teacher education. *World Journal on Educational Technology: Current Issues*, *17*(3), 158-169. https://doi.org/10.18844/wjet.v17i3.9441

1. Introduction

Promoting digital competence is a key objective applicable both to the overall training of citizens and specifically, under the Bologna Process, to future teachers (Marín-Suelves et al., 2022; Örtegren, 2022). Røkenes and Krumsvik (2014) state that it is of particular interest to assess the level of their technological skills to improve this aspect of their future professional life. In fact, there are numerous national and international frameworks serving to diagnose and/or evaluate these levels (Ferrari, 2013; Redecker & Punie, 2017; INTEF, 2022, 2023).

Training in the use of Information and Communication Technologies (henceforth ICT) also stands out as a predictor of academic success (Cabero-Almenara et al., 2023). However, there is disaccord when comparing the curricula of the Conference of Rectors of Spanish Universities (henceforth CRUE) when addressing the ethical dimension of ICT expertise (Novella & Cloquell, 2021).

This translates into a deterioration of the academic and future professional profile of pre-service teachers (plagiarism, abuse of generative tools, etc.) in multiple Faculties of Education (Cebrián-Robles et al., 2020; Gallent-Torres et al., 2023). Specifically, the study carried out by Pérez-Martín and Martínez-Luna (2017) has revealed many cases of plagiarism among the final degree projects of future teachers of Early Childhood and Primary Education.

Simultaneous to witnessing this exponential ethical decline, there is empirical evidence that future pupils of pre-service teachers are likewise not oblivious to this problem. Current research focusing on minors (early childhood students) reveals that they lack prosocial skills when it comes to interacting with robots (Gómez-León, 2023). There is an absence of civic channels for an adequate level of understanding.

1.1. Related research

Nowadays, the development of digital competences for citizenship, also known as digital citizenship competence, is insufficiently enhanced in teacher training programs. In fact, Örtegren and Olofsson (2024) underline that '…increasingly pervasive digital technologies in societies are placing complex demands on the development of young people's digital citizenship and digital competence. Social science education and teacher education play important, but poorly understood, roles in this development' (p. 526).

According to Falloon (2020), being digitally competent requires considering issues related to digital citizenship (ethics, protection of data, etc.). Although it is not integrated explicitly in university curricula, Novella and Cloquell (2021) justify the relevance of promoting the digital competence of pre-service teachers from an ethical, safe and responsible approach. It is noticeable that training future teachers in digital citizenship competency entails positive effects on the acquisition of democratic principles (Örtegren, 2022).

Another focus of attention is on the rules of etiquette on the Internet (netiquette) and the degree of compliance by digital citizens (Al-Khatib, 2023). Balladares-Burgos and Jaramillo-Baquerizo (2022) suggest that lack of self-judgement will lead to a substantial deterioration of the management of virtual identity and, therefore, of personal data. At this point, it is possible to assert that the imbalance between the theoretical foundations (knowledge) and the practice in question (know-how) undermines the equanimity of the current generation of university students (knowledge of how to be).

Authors such as Bolívar (2005) have traditionally centered their objectives on inserting professional ethics curricula in the framework of the European Higher Education Area (EHEA). Roughly speaking, this represents a positive extension, applied and based on values and virtues of deontological codes (obligations, duties, etc.) of multiple professions. Specifically, from the teaching perspective, professional ethics stemmed from three elements (ethics of care, trust and personal responsibility) that future teachers must develop towards the end of their initial training (Bolívar & Pérez, 2022).

Experts have suggested that a B1 level of accreditation in ethical commitment should be a common predicate required of pre-service teachers before ending their university training. García-López et al. (2009) state that an underline these goals (that underlie techno-pedagogical actions) require a transversal approach to ethical values in training programs. To date, the findings of neuroscience research also support the role of

neurotics in promoting moral education (Pallarés-Domínguez, 2017; Tnibar-Harrus & Tnibar-Harrus, 2024). Carrera-Farran et al. (2016), on the other hand, highlights three aspects of techno ethics pending exploration: ethics as a commitment to action and research, as a means of regulating researchers, and as an object of study.

1.2. Current technological challenges

At an international level, specifically in the United Nations, it is becoming evident that there is a need to create a specific entity to address the ethical dilemmas arising from the use of Artificial Intelligence (henceforth AI). This is seconded by Gilani et al. (2023) in their latest report on the right to privacy. In response to this, the European University Association (EUA) has categorically maintained that '… the Higher Education sector must adapt its approaches so that new Artificial Intelligence tools are used effectively and appropriately' (Conference of Rectors of Spanish Universities, 2023, p. 1).

In a broader sense, Flores-Vivar and García-Peñalvo (2023) propose a series of recommendations, notably the implementation of a Digital-AI Literacy Plan aimed at training active teaching staff (teaching perspective); the development of an AI Ethics Observatory (research perspective); the promotion of new ICT skills based on lines such as computational thinking (student perspective); the implementation of awareness-raising policies in educational matters (institutional perspective), etc. Apart from this is the volume of demand from the students themselves favouring AI training in Education Degrees (Goenechea & Valero, 2024).

There is, at the same time, a wide range of university education courses revealing that students apply Generative Artificial Intelligence systems poorly. An example is that noted by Cuesta-García et al. (2024), which focuses on examining the strategies applied to writing by future Early Childhood Education teachers at the University of Barcelona (Spain). This was carried out by collecting an assemblage of expository texts and draughts, which served as data analysis, from the group of students.

As noted by Díaz-Cuevas and Rodríguez-Herrera (2024), it is urgent to not only include reflective approaches to academic writing processes but to design strategies favouring responsible uses of AI in higher education. Sánchez-Trujillo et al. (2024) also undertook a similar study in Peru with future Primary Education teachers in the Faculty of Education which led to the forming of specific focus groups serving to delve into the student perceptions and attitudes. Their findings concerning this aspect of the study suggest that although participants already had experience using the Chat Generative Pre-Trained Transformer (henceforth Chat GPT) tool, they doubted its pedagogical utility. This was followed by a practice period consisting of three phases: awareness, integration of the tool and evaluation. They also relied on specific guides and guidelines to avoid verification bias; that is, they corroborated the sources proposed by ChatGPT, contrasted its list, etc. Given this situation, Ayuso-del-Puerto and Gutiérrez-Esteban (2022) concluded that incorporating AI in the initial training period can generate a greater predisposition towards the use of ICT.

1.3. Research problem

The impact of emerging technologies (AI, robotics, etc.) also influences the current situation of the international diagnostic frameworks of digital competence, maximum in the European Framework of Digital Competence for Citizens (henceforth, Dig Comp) (Mattar et al., 2022). Immersed in an academic context-, marked by the widespread presence of Artificial Intelligence tools, there is a lack of knowledge regarding the enhancement of digital citizenship competency in teacher training programs. There is a growing interest in addressing the development of digital competence of pre-service teachers in Education Degrees, but most studies focus mainly on the acquisition of technical skills. In fact, the predominant approach is based on an instrumental perspective, rather than including civic and ethical issues (Novella & Cloquell, 2021). This research problem, which is related to the field of educational technology, should be examined in depth.

The general objective of this study was to identify the level of digital competence, according to the diagnostic framework of the Digital Competence for Citizens, of students pursuing degrees in Early Childhood and Primary Education at the University of Granada in Ceuta due to its dual status: as citizens and as future professionals of education. The objective is specified by the following research questions:

RQ 1. According to their competency profiles, what are the main strengths and areas for improvement (training gaps) of future teachers' digital competence?

RQ 2. What competency profiles of future teachers are predominant for the promotion of digital competence?

RQ 3. According to their competency profiles, to what extent do future teachers carry out techno-pedagogical actions in a critical, ethical and responsible manner?

2. Methods and Materials

2.1. Research method

The method of empirical study, which was carried out during the 2023/2024 academic year, adopted a quantitative, non-experimental and cross-sectional design (Cohen & Manion, 1990).

2.2. Participants

The sample under study consisted of 74 pre-service teachers pursuing degrees in Early Childhood and Primary Education at the Faculty of Education, Economy and Technology of Ceuta of the University of Granada (Spain). The type of sampling was deliberately non-random, with selection limited only to students enrolled in Practicum II of each of the degrees. Participants were chosen based on this criterion since students in their last year of training, who are involved in internships, can enhance their digital competence from an ethical, responsible, and critical approach in two different contexts: the faculty (seminars) and at internship centres, as part of their commitment to the Practicum II subject.

The distribution of the sample of future teachers pursuing a degree in Primary Education is broken down into the following branches: Hearing and Language, 9.5%; Special Education, 27%; Physical Education, 10.8%; General Primary Education, 1.4%; and Foreign Language (English), 20.3%. For its part, the degree in Early Childhood Education comprised 31% of the respondents, mostly females.

2.3. Data collection

An *ad hoc* questionnaire was created and validated by means of the Expert Judgment technique. In this regard, authors such as Pozo-Sánchez et al. (2020) support applying the technique of questionnaires to analyse the subject of digital competence of teaching staff to 'analyse the existence and level of incidence of extrinsic and intrinsic factors in the object of study' (p. 147).

This questionnaire, entitled 'Competences for the Development of Digital Citizenship in Initial Teacher Training' (CD-DCITT), comprises 40 Likert-type items with five response options. These ranged from 1 = insufficient (minimum level) to 5 = excellent (maximum level). As noted in Table 1, each area of the questionnaire is associated with a series of indicators that serve as guides to formulate the items. In fact, for the design of the instrument, we considered firstly a series of standardised scales like those developed by Cabero-Almenara et al. (2020), Kuş et al. (2017) and Tzafilkou et al. (2022).

Table 1

Dimensional structure of the questionnaire

Areas of development of competence according to the Dig Comp framework (Ferrari, 2013)	Associated indicators	Items
A. Information and data literacy	Analysis of information with systems of Artificial Intelligence Critical attitude towards the	A1, A2, A3, A4, A5, A6 y

	quality of sources Management of own and other people's data Digital pedagogy	A7
B. Communication and collaboration	Netiquette management Online feedback E-commerce Online citizen participation	B8, B9, B10, B11, B12, B13, B14, B15, B16 y B17
C. Digital content creation	Use of traditional and emerging ICTs Personalisation of the teaching-learning process Digital accessibility Copyright and licensing	C18, C19, C20, C21, C22, C23, C24, C25 y C26
D. Safety	Ethical commitment to ICTs Protection of own and other people's devices Promoting student health Sustainable use of ICTs	D27, D28, D29, D30, D31, D32, D33, D34 y D35
E. Problem solving	Technical problems Identification of needs in teaching processes (availability, gaps) Creative solutions with ICTs to address social problems	E36, E37, E38, E39 y E40

The questionnaire was administered in person after obtaining written consent from each respondent, guaranteeing the confidentiality of data. In accordance with articles 5 and 6 of the Spanish Organic Law on Data Protection and Guarantee of Digital Rights, the processing of the data collected through this instrument was analysed anonymously and confidentially. All participants gave their express consent to the processing of their personal data for this study.

2.4. Data analysis

A statistical K-means cluster analysis was applied to the data gathered by means of IBM SPSS Statistics 23.0 software (George & Mallery, 2003). This type of non-hierarchical analysis allowed grouping the pre-service teachers from the survey according to their similarities. Specifically, the method identified whether there are competency profiles or characteristic groups of subjects along the lines of their levels of digital competence.

Based on the competency profiles, we were also able to know the main strengths and areas of improvement (training gaps) of the future students, as well as their performance in techno-pedagogical actions.

3. Results /Findings

All the research questions of the study were addressed by means of a K-means cluster analysis. In this case, the main intention was to determine the profiles characteristic of future teachers by exploring the degree of homogeneity of their digital competence. This also implied identifying the strengths and areas of improvement (training gaps), as well as analysing the level of performance in techno-pedagogical actions. A first cluster from the total number of participants (n=74) consisted of 33 pre-service teachers, a number equivalent to 45% of the subjects. A second cluster consisting of 41 participants assembled more than half of the sample (55%). We can observe that the first cluster comprises future teachers whose responses align, for the most part, with a performance rated as either sufficient or moderate. The second cluster, on the contrary, reveals an increase in competence levels for practically all items as they are qualified as either outstanding or excellent.

The results of the cluster analysis reveal heterogeneous future teacher responses. Broadly speaking, the main findings stemming from comparing the clusters refer to the skills of information analysis using Artificial Intelligence systems and applications, the promotion of a critical attitude in students (techno-pedagogical actions), as well as the implementation of safe behaviour and citizen participation (using digital certificates and licences, collaborating in online campaigns, etc.).

The distances increase between the opposing positions concerning the skills of creating individualised content with both traditional and emerging ICTs. However, there is a noticeable unanimity or equal performance between the groups of future teachers on issues such as formulating queries through Chat GPT, mastering basic guidelines, installing security programmes on other people's computers, controlling energy consumption of ICTs, etc. In this respect, it is possible to infer a level of achievement between moderate and outstanding.

An analysis of variance (ANOVA) was also carried out to determine whether there were significant differences between the clusters. Table 2 reveals that except for item D33 the p-value for the entire set of items is less than 0.05 meaning that differences are highly significant in all areas of competence except for digital safety (environmental protection).

Table 2

Cluster/conglomerate variance analysis

Items	Cluster/Conglomerate		Error		*F*	Significance
	Root square mean	d.f.	Root square mean	d.f.		
Item A1	16.647	1	1.144	72	14.556	.000
Item A2	23.197	1	1.190	72	19.497	.000
Item A3	8.863	1	1.185	72	7.481	.008
Item A4	15.061	1	1.081	72	13.938	.000
Item A5	20.653	1	.507	72	40.761	.000
Item A6	21.378	1	.462	72	46.243	.000
Item A7	20.855	1	.962	72	21.678	.000
Item B8	19.104	1	1.067	72	17.897	.000
Item B9	20.196	1	.661	72	30.557	.000
Item B10	17.036	1	.847	72	20.101	,000
Item B11	18.284	1	1.056	72	17.321	.000
Item B12	11.456	1	.926	72	12.373	.001
Item B13	8.454	1	1.871	72	4.519	.037

Item B14	54.596	1	1.504	72	36.307	.000
Item B15	41.321	1	1.223	72	33.776	.000
Item B16	16.905	1	.947	72	17.850	.000
Item B17	10.290	1	1.639	72	6.279	.014
Item C18	33.558	1	.654	72	51.294	.000
Item C19	34.554	1	1.111	72	31.104	.000
Item C20	24.902	1	.777	72	32.030	.000
Item C21	24.619	1	.822	72	29.960	.000
Item C22	31.079	1	.990	72	31.384	.000
Item C23	9.514	1	1.694	72	5.617	.020
Item C24	10.699	1	1.100	72	9.726	.003
Item C25	37.319	1	1.042	72	35.818	.000
Item C26	28.190	1	1.000	72	28.179	.000
Item D27	19.214	1	1.120	72	17.156	.000
Item D28	29.171	1	1.030	72	28.309	.000
Item D29	9.573	1	1.015	72	9.430	.003
Item D30	11.371	1	.885	72	12.848	.001
Item D31	22.653	1	.936	72	24.198	.000
Item D32	9.710	1	1.275	72	7.615	.007
Item D33	2.680	1	1.213	72	2.210	.142
Item D34	21.115	1	1.263	72	16.718	.000
Item D35	16.905	1	1.197	72	14.122	.000
Item E36	7.717	1	.703	72	10.976	.001
Item E37	26.050	1	1.027	72	25,359	.000
Item E38	16.802	1	.741	72	22.688	.000
Item E39	22.114	1	.859	72	25.751	.000
Item E40	26.667	1	.860	72	31.004	.000

After comparing the values of the *F* coefficient, the study highlights the items (with values ranging from 46 to 30) with the greatest levels of significance:

- Item A6: a group of future teachers marked by a moderate level regarding the design of activities leading to a critical, ethical and responsible use of ICTs stands out when compared to group of peers marked by an outstanding level.
- Item A5: the same situation occurs regarding the performance of another techno-pedagogical action ('I can teach my future students to differentiate between reliable and unreliable sources').
- Item B14: this item sheds light, on the one hand, on an outstanding competence profile in the use of online certificates recognised by the authorities while, on the other hand, it alerts that there are future teachers characterised by lower competence levels.
- Item C25: when it comes to protecting other people's digital content, there are also differences between the groups of pre-service teachers. In this case, certain reveal poor or limited skills while others have outstanding proficiency levels.
- Item B15: Thirty-three future teachers are moderately confident they can help others with online procedures, while the other respondents claim to possess an outstanding level of competence.
- Item C20: pre-service teachers of the first cluster perform moderately well in creating individualised digital content for their future pupils. The others, on the other hand, reveal an excellent mastery of the task.

The evidence gleaned from this investigation confirms the existence of two clusters that portray two groups of future teachers in Ceuta of Early Childhood and Primary Education. They each are marked by differing characteristics, while simultaneously remaining quite homogeneous. The first cluster consists of future teachers

who manifest a moderate level of management of their own data, that of students, and that of other citizens. This represents a tendency towards intermediate or moderate positions that also arises when dealing with skills in communication and collaboration (e-commerce, feedback, etc.). In this case, an exception is that of online purchases in the sense that this group is relatively solvent when avoiding potential frauds and commercial scams. However, they reveal a limited level considered only sufficient when generating creative content resorting to emerging ICTs (digital content creation area). Their level of competence increases, that is, attains outstanding levels, when dealing with practical safety issues (making backup copies, using and not uninstalling antivirus software, updating devices, etc.) and sustainable development with ICTs. The members of this cluster also reaffirm a moderate position in the items aimed at solving problems of both microenvironmental (reducing barriers in the teaching-learning process) and macroenvironment (offering creative responses to social problems) nature.

The second cluster, on the other hand, brings together future teachers who are highly competent in the key skills of this study, that is, those focused on a critical, ethical, and responsible use of ICT resources. This is demonstrated by the lack of stance towards minimal or sufficient competence levels among all the items. The pre-service teachers in this case declare having achieved an outstanding level (except for the first) among the items in information and data literacy. In this respect, their approach to Artificial Intelligence reveals a moderate level. The same occurs regarding issues in communication and collaboration. Although the level of this group of future teachers achieves excellence, their degree of mastery once again drops (lower level) when using Chat GPT (moderate level). Nor do the skills of these participants stand out when it comes to their participation in online dissemination events on the management of AI systems. However, the opposite is foreseen when creating individualised digital content as a measure to draw attention to diversity. Specifically, future teachers belonging to this cluster achieve the highest level of competence (excellent). In line with a low level of AI management, this group, when creating content, prioritises the use of traditional over emerging ICT resources (i.e., augmented reality, robotics). This is evidenced by the high or excellent values concentrated in item C18 ('I am able to create original digital content using traditional ICT resources, for example, a desktop computer'). Pre-service teachers are also very skilled at applying safety measures, although they reveal moderate skills when managing the programs of other computer equipment unknown to them. Ultimately, they are credited with an outstanding level of detecting technical failures, situations arising from the digital divide, etc. (problem-solving area).

4. Discussion and conclusions

The development of digital skills among university students is seen as a key axis in achieving a more inclusive, higher quality society (Cabero-Almenara & Valencia-Ortiz, 2019; Latorre-Medina et al., 2021). This study adopted a critical, ethical, and responsible approach to shed light on the current state of professional training of pre-service teachers at the University of Granada based in Ceuta. Specifically, for each research question, the following aspects can be highlighted:

RQ 1. According to their competency profiles, what are the main strengths and areas for improvement (training gaps) of future teachers?

The results reveal two competence profiles. The first group of future teachers present sufficient and moderate levels of competency whereas the second reveals even better levels approaching excellence. In fact, there is thus a growing trend of competency among the different areas, especially in communication and collaboration (e-commerce, in line with the findings of the research carried out by Ata and Yildirim (2019). In this regard, they reported that pre-service teachers of Turkey considered themselves especially skilled in digital communication, as well as in virtual participation. This is also convergent with the study by Baysan and Çetin (2021) which confirms that only 14.5% of active Turkish teachers require additional ethical training in the communication area.

Simultaneously, it is observed in our study that the performance of both groups is remarkable when it comes to applying basic safety guidelines, rationalizing the use of energy of devices, and solving technical problems (safety and problem-solving areas). However, the two profiles share moderate rates regarding both

the use of Chat GPT and when taking part in online dissemination events. This contrasts with the data from the study by Marín-Suelves et al. (2022) that identified a greater mastery in information and data literacy. The ANOVA analysis of the clusters also yielded significant differences (opposing positions) related to carrying out tasks of citizen participation such as helping third parties with online administrative procedures, explaining how PIN codes work, etc.

RQ 2. What competency profiles of future teachers are predominant for the promotion of digital competence?

Based on the results, we can identify the presence of two groups of competent profiles among the participants. On the one hand, we find a group of future teachers whose status is moderate and sufficient to, for example, create individualized digital contents and, on the other hand, there is a group of future teachers with an outstanding and excellent level of performance in issues that are very linked to promoting inclusion (digital accessibility). Spanish authors such as Gabarda-Méndez et al. (2023) have already focused on the level of digital competence in inclusion issues among future teachers. In fact, four groups/clusters with different characteristics were detected. According to these findings, pre-service teachers:

Perceive inclusion as one of the main challenges of the education system and that technology can contribute to making teaching practice more inclusive, allowing it to be adapted to specific needs and highlighting the importance of teacher training in both digital competence and inclusion as an educational principle (p. 9305).

RQ 3. According to their competency profiles, to what extent do future teachers carry out techno-pedagogical actions in a critical, ethical and responsible manner?

The observations indicate that the members of the second cluster demonstrate high level of proficiency in techno-pedagogical matters, as it is noticeable in item A5 ('I am able to teach my future students to differentiate between reliable and unreliable sources') and item A6 ('I know how to design activities where my future students have to critically use ICT resources such as computers, tablets, etc.').

Although the setting of the current study is academic related to education in digital safety like the work of Torres-Hernández and Gallego-Arrufat (2024), it is not free of certain limitations. One is its small non-random sample with a reduced geographical scope meaning it offers less potential for generalizations. The design of a Likert scale with five response options is another weak point as it is not simple to differentiate the profiles that tend to be neutral (moderate level). Furthermore, the subject of digital competence for citizens was only analyzed from the point of view of future teachers.

5. Recommendations/Future directions

The existing literature shows the relevance of examining the degree of digital citizenship competency of future teachers in response to an increasingly technological academic context. After the proliferation of systems based on Artificial Intelligence, the analysis of the civic dimension of digital competence in teacher education constitutes a necessary current focus of study. In fact, the present research can be aligned with the social impact area of the fourth Sustainable Development Goal which is focused on quality education, equitable access, inclusion, etc. It would also be of interest to address the question of competence from the standpoint of the digital ethics of other members of the university community (associate teachers, research assistants, etc.) considering the key role that institutions of higher education play in building society comprising more committed and responsible digital citizens. In this respect, the University of Granada (Spain) is leading a research project which focuses on the field of the professional teaching ethics and initial teacher training. There are hardly any empirical studies in Spain that have addressed this issue or topic (Tnibar & Latorre, 2024). In fact, a macro-diagnosis on the professional ethics is currently being carried out with the aim to determine the state of the art in teacher training at the Faculty of Education, Economy and Technology of Ceuta of the University of Granada

and to assess whether ethical competence can be considered as a viable characteristic in the selection of the future teachers. This is an innovative line of work in the Spanish university context. The project, entitled *Ethical teacher leadership as a discriminating element in initial teacher training*, has been funded by the Vice-rectorate for Research and Transfer of the University of Granada and the Autonomous City of Ceuta, in Spain (Reference CE-02-UGR24). One of the first objectives of the project concerns the figure of the trainers of future teachers, in an attempt to answer the following question: are university teachers committed to the training of future teachers? The results of this study will contribute to the academic debate in a meaningful manner.

Ethical Approval: We considered the Code of Good Practice in Research established by the Ethics Committee of the University of Granada.

Conflict of Interest: There is no conflict of interest.

Acknowledgments: The current study was funded by a grant awarded by the Vice-rectorate for Research and Transfer of the University of Granada on a competitive basis for the 2023/2024 academic year.

References

Al-Khatib, T. (2023). Netiquette rules in online learning through the lens of digital citizenship scale in the post-corona era. *Journal of Information, Communication and Ethics in Society, 21*(2), 181–201. https://doi.org/10.1108/JICES-08-2021-0089

Ata, R., & Yıldırım, K. (2019). Turkish pre-service teachers' perceptions of digital citizenship in education programs. *Journal of Information Technology Education: Research, 18*, 419–438. https://doi.org/10.28945/4392

Ayuso-del-Puerto, D., & Gutiérrez-Esteban, P. (2022). La inteligencia artificial como recurso educativo durante la formación inicial del profesorado. *RIED—Revista Iberoamericana de Educación a Distancia, 25*(2), 347–362. https://doi.org/10.5944/ried.25.2.32332

Balladares-Burgos, J., & Jaramillo-Baquerizo, C. (2022). Valores para una ética digital a partir de las generaciones digitales y el uso de las redes sociales: Una revisión de la literatura. *Revista 593 Digital Publisher CEIT, 7*(1), 40–52. https://doi.org/10.33386/593dp.2022.1.747

Baysan, E., & Çetin, Ş. (2021). Determining the training needs of teachers in ethical use of information technologies. *Kuramsal Eğitimbilim Dergisi (Journal of Theoretical Educational Science), 14*(3), 476–497. https://hdl.handle.net/11630/10496

Bolívar, A. (2005). El lugar de la ética profesional en la formación universitaria. *Revista Mexicana de Investigación Educativa, 10*(24), 93–123. https://www.redalyc.org/articulo.oa?id=14002406

Bolívar, A., & Pérez, P. (2022). El compromiso y la ética profesional en el acceso a la docencia. *Innovación Educativa, 32*, 1–17. https://doi.org/10.15304/ie.32.8699

Cabero-Almenara, J., & Valencia-Ortiz, R. (2019). TIC para la inclusión: Una mirada desde Latinoamérica. *Aula Abierta, 48*(2), 139–146. https://doi.org/10.17811/rifie.48.2.2019.139-146

Cabero-Almenara, J., Barroso-Osuna, J., Gutiérrez-Castillo, J. J., & Palacios-Rodríguez, A. (2020). Validación del cuestionario de competencia digital para futuros maestros mediante ecuaciones estructurales. *Bordón. Revista de Pedagogía, 72*(2), 45–63. https://doi.org/10.13042/Bordon.2020.73436

Cabero-Almenara, J., Gutiérrez-Castillo, J. J., Guillén-Gámez, F. D., & Gaete-Bravo, A. F. (2023). Digital competence of higher education students as a predictor of academic success. *Technology, Knowledge and Learning, 28*(2), 683–702. https://doi.org/10.1007/s10758-022-09624-8

Carrera-Farran, X., González-Martínez, J., & Coiduras-Rodríguez, J. L. (2016). Ética e investigación en tecnología educativa: Necesidad, oportunidades y retos. *RIITE Revista Interuniversitaria de Investigación en Tecnología Educativa*, 34–43. https://doi.org/10.6018/riite2016/261081

Tnibar-Harrus, C. & Latorre-Medina, M.J. (2025). Profiling competences for the development of digital citizenship in teacher education. *World Journal on Educational Technology: Current Issues*, *17*(3), 158-169. https://doi.org/10.18844/wjet.v17i3.9441

Cebrián-Robles, V., Raposo-Rivas, M., & Ruiz-Rey, F. J. (2020). Conocimiento de los estudiantes universitarios sobre herramientas antiplagio y medidas preventivas. *Pixel-Bit. Revista de Medios y Educación, 57*, 129–149. https://doi.org/10.12795/pixelbit.2020.i57.05

Cohen, L., & Manion, L. (1990). *Métodos de investigación educativa*. La Muralla.

Conference of Rectors of the Spanish Universities (CRUE). (2023). La EUA publica un documento sobre el uso de herramientas de inteligencia artificial en Educación Superior. https://www.crue.org/2023/02/crue-se-alinea-con-la-postura-de-la-eua-sobre-el-uso-de-herramientas-de-inteligencia-artificial-en-educacion-superior/

Cuesta-García, A., González-Argüello, V., & Pujolà-Font, J. T. (2024). El desarrollo del pensamiento crítico en procesos de escritura con herramientas de inteligencia artificial generativa. *Revista Nebrija de Lingüística Aplicada a la Enseñanza de Lenguas, 18*(36), 80–106. https://doi.org/10.26378/rnlael1836569

Díaz-Cuevas, A. P., & Rodríguez-Herrera, J. D. (2024). Usos de la inteligencia artificial en la escritura académica: Experiencias de estudiantes universitarios en 2023. *Cuaderno de Pedagogía Universitaria, 21*(42), 25–44. https://doi.org/10.29197/cpu.v21i42.595

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. *Educational Technology Research and Development, 68*(5), 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Ferrari, A. (2013). *DIGCOMP: A framework for developing and understanding digital competence in Europe*. Publications Office of the European Union. http://dx.doi.org/10.2788/52966

Flores-Vivar, J. M., & García-Peñalvo, F. J. (2023). Reflexiones sobre la ética, potencialidades y retos de la inteligencia artificial en el marco de la educación de calidad (ODS4). *Comunicar, 31*(74), 37–47. https://doi.org/10.3916/C74-2023-03

Gabarda-Méndez, V., Marín-Suelves, D., Gabarda-Méndez, C., & Ramon-Llin-Mas, J. A. (2022). Future teachers facing the use of technology for inclusion: A view from digital competence. *Education and Information Technologies, 28*(8), 9305–9323. https://doi.org/10.1007/s10639-022-11105-5

Gallent-Torres, C., Zapata-González, A., & Ortego-Hernando, J. L. (2023). El impacto de la inteligencia artificial generativa en educación superior. *RELIEVE, 29*(2), 1–20. https://doi.org/10.30827/relieve.v29i2.29134

García-López, R., Sales-Ciges, A., Moliner-García, O., & Ferrández-Barrueco, R. (2009). La formación ética profesional desde la perspectiva del profesorado universitario. *Teoría de la Educación. Revista Interuniversitaria, 21*(1). https://doi.org/10.14201/3166

George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference*. Allyn & Bacon.

Gilani, S. R., Al-Matrooshi, A. M., & Haroon Khan, M. H. (2023). Right of privacy and the growing scope of artificial intelligence. *Current Trends in Law and Society, 3*(1), 1–11. https://journals.internationalrasd.org/index.php/ctls/article/view/1633

Goenechea, C., & Valero, C. (2024). Educación e inteligencia artificial: Un análisis desde la perspectiva de docentes en formación. *REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación, 22*(2), 33–50. https://doi.org/10.15366/reice2024.22.2.002

Gómez-León, M. I. (2023). Robots sociales y crecimiento ético en Educación Infantil. *Edutec. Revista Electrónica de Tecnología Educativa, 83*, 41–54. https://doi.org/10.21556/edutec.2023.83.2697

INTEF. (2022). *Actualización del marco de referencia de la competencia digital docente*. http://aprende.intef.es/mccdd

INTEF. (2023). *Generación D: Cuestionario de autodiagnóstico de competencias digitales de la ciudadanía*. https://intef.es/Noticias/generacion-d-cuestionario-de-autodiagnostico-de-competencias-digitales-de-la-ciudadania/

Kuş, Z., Güneş, E., Başarmak, U., & Yakar, H. (2017). Gençlere yönelik dijital vatandaşlık ölçeğinin geliştirilmesi. *Journal of Computer and Education Research, 5*(10), 298–386. https://doi.org/10.18009/jcer.335806

Latorre-Medina, M. J., García-Guzmán, A., & Bermúdez-Martínez, M. (2021). La investigación sobre innovación docente a través de las TIC. In M. J. Latorre-Medina, M. Bermúdez-Martínez, & A. García-Guzmán (Coords.), *TIC, innovación docente y buenas prácticas* (pp. 21–43). Universidad de Granada.

Tnibar-Harrus, C. & Latorre-Medina, M.J. (2025). Profiling competences for the development of digital citizenship in teacher education. *World Journal on Educational Technology: Current Issues*, *17*(3), 158-169. https://doi.org/10.18844/wjet.v17i3.9441

Marín-Suelves, D., Gabarda-Méndez, V., & Ramón-Llin Mas, J. A. (2022). Análisis de la competencia digital del futuro profesorado mediante un diseño mixto. *RED. Revista de Educación a Distancia, 22*(70). https://doi.org/10.6018/red.523071

Mattar, J., Santos, C. C., & Cuque, L. M. (2022). Analysis and comparison of international digital competence frameworks for education. *Education Sciences, 12*(12), 932. https://doi.org/10.3390/educsci12120932

Novella, C., & Cloquell, A. (2021). The ethical dimension of digital competence in teacher training. *Education and Information Technologies, 26*, 3529–3541. https://doi.org/10.1007/s10639-021-10436-z

Örtegren, A. (2022). Digital citizenship and professional digital competence: Swedish subject teacher education in a postdigital era. *Postdigital Science and Education, 4*, 467–493. https://doi.org/10.1007/s42438-022-00291-7

Örtegren, A., & Olofsson, A. D. (2024). Pathways to professional digital competence to teach for digital citizenship. *Teachers and Teaching, 30*(4), 526–544. https://doi.org/10.1080/13540602.2024.2342860

Pallarés-Domínguez, D. (2017). Neuroeducación en diálogo: Neuromitos en el proceso de enseñanza-aprendizaje y en la educación moral. *Pensamiento, 72*(273), 941. https://doi.org/10.14422/pen.v72.i273.y2016.010

Pérez-Martín, J. M., & Martínez-Luna, S. (2017). Ideas alternativas sobre el TFG en estudiantes de Magisterio. *ReiDoCrea, 6*, 246–259. http://hdl.handle.net/10481/48548

Pozo-Sánchez, S., López-Belmonte, J., Fernández-Cruz, M., & López-Núñez, J. A. (2020). Análisis correlacional de factores incidentes en la competencia digital del profesorado. *REIFOP, 23*(1). https://doi.org/10.6018/reifop.396741

Redecker, C., & Punie, Y. (2017). *Digital competence for educators: DigCompEdu*. Publications Office of the European Union. https://publications.jrc.ec.europa.eu/repository/handle/JRC107466

Røkenes, F. M., & Krumsvik, R. J. (2014). Development of student teachers' digital competence: A literature review. *Nordic Journal of Digital Literacy, 9*(4), 250–280. https://doi.org/10.18261/issn1891-943x-2014-04-03

Sánchez-Trujillo, M. A., Rodríguez-Flores, E. A., & Suárez-Pizzarello, M. (2024). ChatGPT como herramienta pedagógica para docentes en formación. *Maestro y Sociedad, 21*(1), 285–299. https://maestroysociedad.uo.edu.cu/index.php/MyS/article/view/6373

Tnibar-Harrus, Ch., & Latorre-Medina, M. J. (2024, November 29). *Teacher training towards the third decade of the 21st century: Advances, challenges and new perspectives* [Poster presentation]. XV International Scientific Conference, Vilnius University, Lithuania. https://www.mokytoju-ugdymas.sa.vu.lt/images/2024/POSTER_PRESENTATIONS/Poster_Congress_Tnibar_Ch__Latorre_MJ_University_of_Granada_Spain.pdf

Tnibar-Harrus, Ch., & Tnibar-Harrus, K. (2024). Neuroeducación: Una revisión sistemática de la literatura. In R. M. Esteban-Moreno et al. (Coords.), *Perspectivas de la neuropedagogía* (pp. 1199–1209). Octaedro.

Torres-Hernández, N., & Gallego-Arrufat, M. J. (2024). Toward an education for digital safety based on self-perceived competences of pre-service teachers. *Computers in the Schools*, 1–21. https://doi.org/10.1080/07380569.2024.2381718

Tzafilkou, K., Perifanou, M., & Economides, A. A. (2022). Development and validation of the students' digital competence scale (SDiCoS). *International Journal of Educational Technology in Higher Education, 19*, 30. https://doi.org/10.1186/s41239-022-00330-0