

Self-perception for teachers' digital competence in Latina University

Autopercepción de la competencia digital docente en la Universidad Latina

Aleida Chavarría 

Universidad Latina de Costa Rica (Costa Rica)

aleida.chavarría@ulatina.cr

Ramon Palau 

Universidad Rovira i Virgili (Spain)

ramon.palau@urv.cat

Raúl Santiago 

Universidad de la Rioja (Spain)

ramon.palau@urv.cat

Received: 08/12/2024

Accepted: 10/04/2025

Published: 01/06/2025

ABSTRACT

It is essential for higher education institutions to prioritize strategies and procedures aimed at enhancing digital teaching skills among faculty. This research focuses on a self-perception evaluation to determine the level of Teacher Digital Competence (TDC) and its correlation with factors such as gender, age, university faculty and type of contract. The study utilized the COMDID-A self-assessment instrument to measure TDC across four dimensions: 1) Didactics, Curriculum and Methodology; 2) Planification, Organization, Space Management and Digital Technological Resources; 3) Relationships, Ethic, and Security, 4) Personal and Professional Development. The findings revealed that teachers, on average, possess a medium level of digital competence. Notably, male teachers under the age of 61 from the faculties of Engineering and Technology, as well as from Graduate School, reported higher self-perceived TDC levels compared to the average across other faculties. However, these results did not show significant correlation between the TDC self-perception and the type of contract held by teachers. Furthermore, no substantial differences were found between faculties regarding the individual dimensions of TDC, though the Personal and Professional Development dimension tended to be perceived more strongly. These findings underscore the need for targeted training initiatives, potentially through innovative pedagogical models or projects, to further enhance faculty digital skills. Additionally, future research should explore the relationship between TDC dimensions and factors such as years of experience and academic discipline across university faculties.

KEYWORDS

Teacher's digital competence; self-perception; higher education; educational technology

RESUMEN

Es importante que las instituciones de educación superior prioricen planes y procedimientos para el desarrollo de habilidades docentes digitales. Esta investigación se ha centrado en realizar una evaluación de la autopercepción

para identificar el nivel de TDC (Competencia Digital Docente) y correlacionarlo con el género, la edad, la facultad universitaria y el tipo de contrato de los docentes. Se utilizó el instrumento de autoevaluación COMDID-A para identificar el nivel de TDC en cuatro dimensiones, 1) Didáctica, currículo y metodología, 2) Planificación, organización, administración del espacio y recursos tecnológicos digitales, 3) Relación, ética y seguridad, 4) Personal y profesional, resultando en un nivel medio de competencia digital de los docentes. Los resultados muestran que los docentes varones menores de 61 años, de la facultad universitaria de Ingeniería y Tecnología, y de la Escuela de Posgrado, se perciben con un nivel superior al promedio de las demás facultades. Además, los resultados no indican diferencia en la autopercepción de TDC correlacionada con el tipo de contrato que tiene el docente y las dimensiones tampoco muestran una diferencia significativa entre facultades, pero hay una tendencia a que se perciba más la dimensión personal y profesional. Por ello, son necesarias acciones formativas a través de un modelo pedagógico o proyecto innovador que permita un mayor desarrollo de las competencias digitales del profesorado. Es muy recomendable un estudio de las dimensiones por facultad universitaria según los años de experiencia y la disciplina.

PALABRAS CLAVE

Competencia digital docente; autopercepción; educación superior; tecnología educativa

RECOMENDED CITE:

Chavarría, A., Palau, R. & Santiago, R. (2025). Self-perception for teachers' digital competence in Latina University. *RiiTE Revista interuniversitaria de investigación en Tecnología Educativa*, 18, 49-67. <https://doi.org/10.6018/riite.642381>

Main contributions of the article and future research lines:

- Contributions to institutional strategies by designing targeted plans and actions to enhance digital teaching skills across faculties.
- Proposal for tailored training to address faculty-specific needs and further develop digital competencies.
- Conduct longitudinal research to track changes in TDC over time, considering technology advancements and updated educational practices.
- Explore how varying levels of TDC among teachers influence student learning outcomes and digital literacy development.

1. INTRODUCTION

Due to the need to transform teaching practice in higher education, institutions face significant challenges in redefining learning and teaching processes to adapt to technological, economic and social changes. These changes require citizens to develop digital competences that are key for continuous learning, social inclusion and active citizenship (Cabero et al. 2020). The teachers' empowerment is what can generate their self-confidence to increase strengths, improve abilities and elevate academic potential as agents of change in the educational context (Amaya, 2018). For the development of digital competencies, teachers must have the desire to stay updated, innovate and remain committed to the idea that technology can improve teaching and learning processes (Zúñiga et al. 2021). There is no doubt that the role of the teacher as guide and facilitator of the process requires digital competences, in other words, the skills, attitude and the expertise in this knowledge society to make a good use of the technology from a didactic-pedagogical view (Cabero et al. 2020). Vega et al. (2021) highlight the importance of the changing role of teachers in the context of the Fourth Industrial Revolution, influenced by innovative methodologies, the use of the internet, artificial intelligence, and Massive

Open Online Course (MOOC), among others. Therefore, the teachers' profile must include digital competences for enhancement in Education quality.

Research on the evaluation of digital competences indicates that teachers generally achieve good levels of Teacher Digital Competence (TDC) and demonstrate a positive attitude toward technology and its use (Paz-Saavedra et al., 2022). Other studies suggest that university teachers, on average, exhibit a moderate level of TDC, with younger teachers showing greater interest in developing these competences (Cabero et al., 2020). However, most research has focused on regions outside Latin America, where there is a notable lack of information on the digital competencies of university-level teachers (Vásquez et al., 2021). Given that the learning transformation requires a high level of TDC in educational institutions, the purpose of this study is to assess teachers' self-perception of TDC in relation to factors such as age, gender, university faculty, and type of contract.

1.2. Teacher's Digital Competence

The *Informe Estado de la Educación* (2021) [Status of Education Report] from Costa Rica highlights the critical importance of providing teachers with training in digital competences. This training enables them to effectively utilize technological tools and programs as part of a professional development program designed to enhance digital skills. The report emphasizes implementing these strategies across all levels of education, from early childhood to higher education.

Various international organizations are actively working to define the characteristics, dimensions and levels of TDC. ISTE (2022) (International Society for Technology in Education) has developed standards contributing with "the competences to learn, teach and lead in the digital era"; UNESCO (2019) created the Framework of Competences for ICT (Information and Communications Technologies) Teachers (ICT-CFT), which promotes the development of TIC standards for teachers. The European TDC Framework is the base for a variety of models, such as the ECD-TIC, NETS-T, ENLACES, DIGCOMP, DigiLit and COMDID-A created to upgrade the quality of education, in accordance with initial and permanent teachers training policies in TDC.

The European Strategy for Universities and the Digital Education Plan 2020-2027 identify digital transformation as the primary challenge. These initiatives emphasize the need for robust technological infrastructure and faculty equipped with adequate TDC to effectively implement actions that support the achievement of their goals (Mora-Cantalops et al. 2022). In Spain, the Conference of Presidents of Spanish Universities (CRUE) has enforced activities to develop teachers' digital competences through the Spanish University System (SUE), including evaluating the perception of TDC within institutions. In this sense, the definition of TDC is "a set of capabilities, skills and attitudes a teacher should develop to integrate digital technologies in teaching practice and their professional development" (Lázaro-Cantabrana et al. 2018). Martín-Cuadrado et al. (2021) emphasize that teacher digital competence is essential for the teaching and learning process in virtual environment, suggesting that teachers enhance their performance by utilizing technological tools and programs to strengthen university learning communities.

A study by Liesa-Orus et al. (2023) concluded that teachers in Europe and Latin America, particularly in countries such as the Dominican Republic, Mexico and Colombia have a positive perception of the use of digital technologies. However, they do not consider themselves competent in this area and recognize the need for further training in the digital field. Similarly, findings from García et al. (2023), Martín-Párraga et al. (2023) and Rojas-Osorio et al. (2024) indicated that Uruguayans and Peruvian teachers

possess a basic level of digital competence. These teachers tend to focus on the technical use of technology rather than its pedagogical applications, such as using it to help students solve problems.

Furthermore, referring to the factors that need to be considered in the level of digital competence studies have addressed the analysis of self-perception of TDC in relation to the factors, age, gender, university faculty and type of contract.

1.1.2. Teachers' age

University teachers undergo extensive years of study, training and preparation to qualify as faculty members. Unlike workers in industries requiring significant physical exertion, their work is primarily intellectual. Although some may hold multiple jobs, the aging process in academia differs significantly. Teaching at the university demands high intellectual engagement, and it is common for faculty to continue working well into older age while staying updated in their field of expertise, educational methodologies, and technological advancements.

Regarding the relationship between teachers' age and their level of digital competence, research indicates differences between age groups, significantly decreasing the level of digital competence with the age of teaching staff (Fernández-Morante et al. (2023) Estela-Dávila et al. (2022), López et al. (2020), Belmonte et al. (2020), Guerrero et al. (2020)). Young teachers obtained higher levels of digital competence in content creation and problem solving, while older teachers get low scores in the mentioned skills (Pozo et al., 2020, Rojas-Osorio et al., 2024).

1.1.3. Teachers' gender

In general, academia is still seeking ways to offer equal growth opportunities for both female and male teachers to reduce the gaps among genders. Technology seems to be a particular subject where males and females could have certain differences, due to the historical and cultural construction of technology as masculine. However, there is not agreement on whether or not gender has an influence on digital competence. Cabero et al. (2020) found no differences in Health teachers. No statistically significant differences were found between men and women (Pozo et al. 2020, Fernández-Morante et al. 2023, Rojas-Osorio et al. 2024), but it is clear that women have a higher level of digital competence than men for the creation of digital content, while men have a greater competence for problem solving, being a medium-low correlation. On the other hand, Fernández-Morante et al. (2023) obtained that gender moderately influences the level of digital competence in teachers, having a more negative effect in women.

1.1.4. Teachers' university faculty

Disciplines at university level have a particular program that indicates what is essential to learn, how is the teaching practice and the use of digital and technologies tools Each teacher has a specific discipline and belongs to a university faculty performing teaching practices, research and other functions. COVID-19 pandemic forced teachers to find solutions using technology to enable ongoing teaching since courses could be not taught on campus, labs, classrooms, clinics or places for professional practicum (Vicentini, 2020).

Teachers in disciplines such as Information Systems and Computer Science often possess intrinsic technological skills that are closely aligned with their professional careers. However, these skills may necessitate a shift in their pedagogical approach to better integrate technology in the learning process

(Starkey and Yates, 2023). Despite the unique nature of each discipline, teachers must possess a comprehensive understanding of their subject, leverage technology to design effective learning strategies, and guide students to learn in different environments, all while fostering discussion and critical thinking. The results from Dias-Trindale and Albuquerque (2022), reveal that the Faculty of Medicine and Faculty of Sport Science and Physical Education received the lowest scores, as both faculties primarily employed face-to-face strategies and hands-on work with patients. In contrast, the Institute for Interdisciplinary Research and College of Arts achieved the highest scores, with some teachers being full-time researchers who utilized teaching methodologies more adapted to the integration of digital strategies. These findings suggest that there is no direct correlation between a teachers' faculty or discipline and their level of digital competences.

1.1.5 Type of contract of teachers

University teachers may hold different type of contracts, which can influence their training and teaching practices. The most common types are permanent employment contracts or full-time positions, which have a long-term, indefinite duration. These positions typically involve comprehensive responsibilities, including teaching, research, and service. Alternatively, fixed-term employment contracts or part-time positions are temporary and often tied to specific teaching research, or project-based activities, with a defined expiration date outlined in the contract.

There is limited research on the relationship between digital competence and the type of contract a teacher holds. However, Hinojo-Lucena et al. (2019) found differences in problem-solving between temporary and permanent teachers. Temporary teachers demonstrated greater problem-solving abilities when using technology, likely due to their experience rotating between different institutions.

2. METHOD

The study followed a quantitative methodology, with a descriptive-correlational and non-experimental design (Hernández-Sampieri et al. 2014). The purpose of the study is to evaluate digital competence of teachers from Universidad Latina during 2022 in relation to the selected factors, such as age, gender, university faculty and type of contract, through the use of a questionnaire as instrument for data collection.

2.1. Study context

Universidad Latina, a private university in Costa Rica, comprises six faculties, offering over 80 undergraduate programs and 33 graduate programs. The institution serves approximately 16.000 students and employs around 1,200 teachers. Within this context, the present study was conducted in 2022 as part of the initiative to enhance digital competences by integrating digital technologies into the learning process.

2.2 Participants

The population studied is composed of teachers from Universidad Latina that were currently employed in 2022. As a criterion for inclusion, it was established that the teacher was employed with any type of contract; full-time or part-time positions. The population was confirmed of 1100 teachers: 880 men (62%) and 300 women (38%). The sample used was non-probabilistic, based on accessibility criteria and

voluntary participants (Hernández-Sampieri et al. 2014). Sample was composed of 413 teachers, being 38% of the total population distributed by gender and university faculty (Table 1).

As part of the sample, 157 are female teachers (38%), with an average age of 42 years old and 255 are male teachers (62%) with an average age of 44 years old.

Besides, the type of contract the participants have, 9% are full time teachers, 74% part time and 17% other type. The university faculty is represented as follow:

Table 1.

Teachers by university faculty and gender

	Gender		
	Teachers	Female	Male
Health Sciences	78	52	26
Art, Design and Communication	44	26	18
Business and Hospitality	100	25	75
Social Sciences	59	25	33
Engineering and Information Technology	88	13	75
Graduate School	44	16	28
Total	413	157	255

Source: authors' elaboration

2.3 Instrument

To identify TDC self-perception, teachers completed a questionnaire with a part one section containing biodata of participants and second section with the auto-perception evaluation (COMDID-A) about teaching digital competences. Data was collected from May to August 2022, through an online questionnaire. A communication was sent by email inviting teachers to participate in the study to complete data and TDC evaluation.

2.3.1 COMDID-A Instrument

The instrument used for data collection was COMDID-A test (Lázaro-Cantabrana & Gisbert-Cervera, 2015), with 7 questions of biographic data of participants, such as university faculty, location, program, type of contract, age, gender and academic degree. It also contains 22 questions divided in four dimensions:

D1: Didactic, curriculum and methodology (6 items)

D2: Planification, organization, space administration and digital technological resources (5 items)

D3: Relation, ethics and security (5 items)

D4: Personal and professional (6 items)

The structure on the four dimensions is relative to the teaching practices (Lázaro-Cantabrana et al., 2018). D1 refers to the planification and organization of the elements that are part of the teaching and learning process; select, evaluate and use of digital technologies as a way to handle the students' needs inside and outside the classroom. D2 is to be able to plan and conduct the use the spaces and technology responsibly. Dimension D3 explains how the teacher uses digital technologies to communicate and

generate knowledge by being responsible, ethical and secure of their use. D4 include the elements that promote continuous improvement of teaching practice in a digitalized society. COMDID-A shows a Kaiser-Meyer-Olkin (KMO) sampling adequacy index of 0.92 and an internal consistency (Cronbach's Alpha) by dimensions of: D1, $\alpha=0.88$; D2, $\alpha=0.88$; D3, $\alpha=0.84$; D4, $\alpha=0.90$ (Palau et al., 2019).

Teachers' reports were analyzed using a quantitative analysis of descriptive correlational research and a non-experimental design (Hernández-Sampieri et al., 2014).

2.4 Data collection

Data was collected through a digital platform, with direct link to the instrument. An invitation document was prepared to inform the teaching staff about the evaluation and was sent by email.

The questionnaire included a consent form, and teachers clicked on the accept button to proceed with completing the instrument. A description and objective were presented at the beginning of the questionnaire, emphasizing the anonymity of the responses. Participants were also informed that the results would be used in general form and that their individual responses would remain confidential.

To increase participation, a reminder was sent and a pop-up was created on the virtual campus to facilitate access to the instrument.

The application was carried out during the second quarter of 2022, obtaining the participation of 413 teachers, which represents 38% of the total population of teachers.

3. RESULTS

The results were analyzed using IBM SPSS Statistics software for Windows, applying variance analysis for parametric and non-parametric tests in order to determine if, there is a correlation between variable level of TDC, age, gender and university faculty and type of contract of the participants. Moreover, Minitab program was used for the Pearson correlation coefficient test considering the dimensions and the Kruskal-Wallis test to study dimensions in regard to university faculty.

3.1 Teacher digital competence (TDC)

In order to evaluate the psychometric properties of scale COMDID-A reliability (internal consistency and validity exploratory factor analysis) tests were used to determine that the scale was valid to represent population values. A high Cronbach's alpha was obtained ($\alpha=0.95$), which demonstrated that the total score scale is reliable. For each dimension the results are D1 ($\alpha=0.84$), D2 ($\alpha=0.85$), D3 ($\alpha=0.86$) and D4 ($\alpha=0.88$). In addition, a construct validity was evaluated using Exploratory Factor Analysis (Method of Varimax rotation) and the following values were obtained from KMO and Bartlett Test, that confirm that the scale is suitable for this type of measurement.

Table 2.

KMO and Bartlett Tests

Kaiser-Meyer-Olkin measure of sampling adequacy		.971
Bartlett square sphericity test	Approx. Chi-	5223

gl.	231
Sig.	.001

Source: authors' elaboration

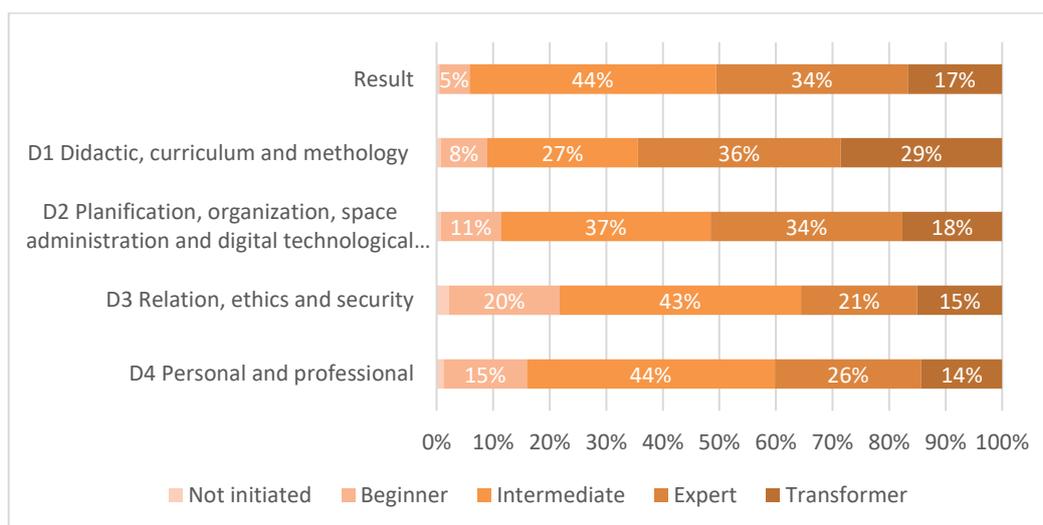
From the performed analysis, four factors explain 63.5% of total variance. This comparison of COMDID-A values revealed that the scale is adequate to measure digital competences in university teachers (Palau et al., 2019).

The COMDID-A an auto-evaluation provides the TDC in four dimensions, each one with five levels in a scale of 1 to 100, these are:

- Not initiated (1 to 10 points)
- Level 1: Beginner (11 to 25 points)
- Level 2: Intermediate (26 to 50 points)
- Level 3: Expert (51 to 75 points)
- Level 4: Transformer (76 to 100 points)

Figure 1.

Distribution by teacher according to self-perception of competence



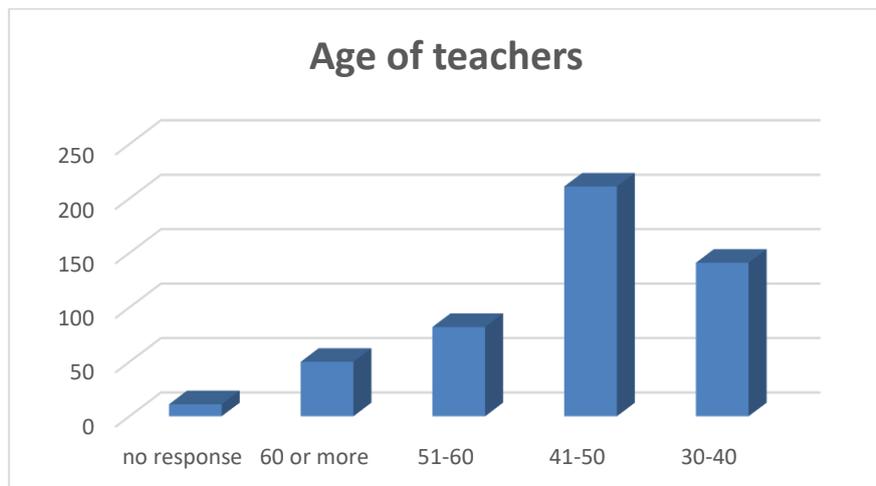
Source: authors' elaboration

The results indicate that the majority of teachers have an intermediate level (44%), while 34% are at the expert level and 17% at the transformer level. Regarding the dimensions, D1 has a 36% at the expert level, and 27% at the intermediate level. In D2, 34% are experts, and 37% are at the intermediate level. For D3, 43% are intermediate, 21% are experts, and 15% transformers, while in D4, 26% are experts, and 44% are intermediate. At lower levels (not initiated and beginners), the majority of teachers are in D3 (20%) and D4 (15%).

3.2 Age of teachers

Regarding the age of teachers, results revealed that 51% are between 41 and 50 years old, followed by group age 30 to 40 years old (34%). Teachers with 60 or more years old are 50, representing 12% of teachers' population.

Figure 2.
Distribution by teacher's age



Source: authors' elaboration

3.3 Teachers' gender

In order to analyze these variables teachers were asked to complete the questionnaire by selecting male, female or not specification. The results were quantified recording their answers.

Table 3.
Teacher's gender

Gender	n	Percentage
Male	255	62 %
Female	157	38 %
Not specified	1	0 %

Source: authors' elaboration

The 62% of teachers from the university are male, while 38% that represents 157 are female teachers.

3.4 University faculty of teachers

The teachers participating in the study belong to a specific university faculty, regardless of their discipline. They completed the questionnaire withing the requested timeframe, indicating the context of their teaching practice.

Table 4.
Teacher's university faculty

University faculty	n	Percentage
Health Sciences	78	18 %
Art, Design & Comm	44	11 %
Business & Hospitality	100	24 %
Social Sciences	59	14 %
Engineering & TI	88	21 %

Graduate School	44	11 %
-----------------	----	------

Source: authors' elaboration

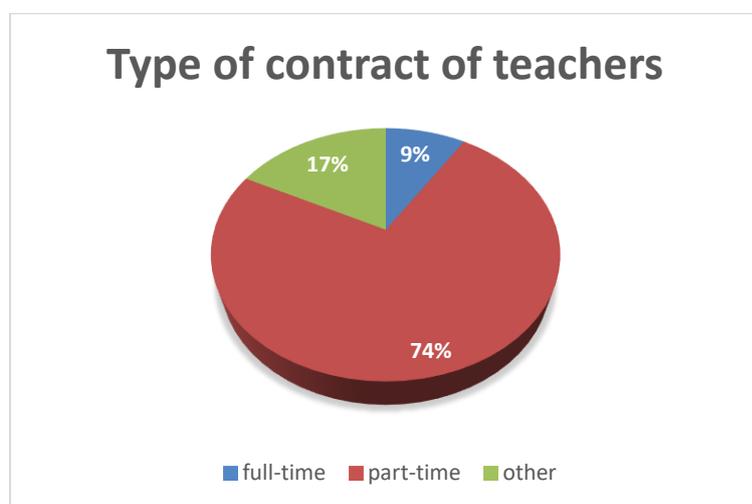
Data indicates teachers from Business & Hospitality are 100 with 24% participation. The university faculties with less teachers in the study are Art, Design & Communication and Graduate School with a 11% participation, that is 44 teachers.

3.5 Type of contract of teachers

There is a majority of teachers with part-time contract, 304 teachers (74%) signed a contract by period, while only 37 teachers (9%) have a full-time contract. In addition, 72 teachers (17%) answered they have another type of contract.

Figure 3.

Distribution by teacher's type of contract



Source: authors' elaboration

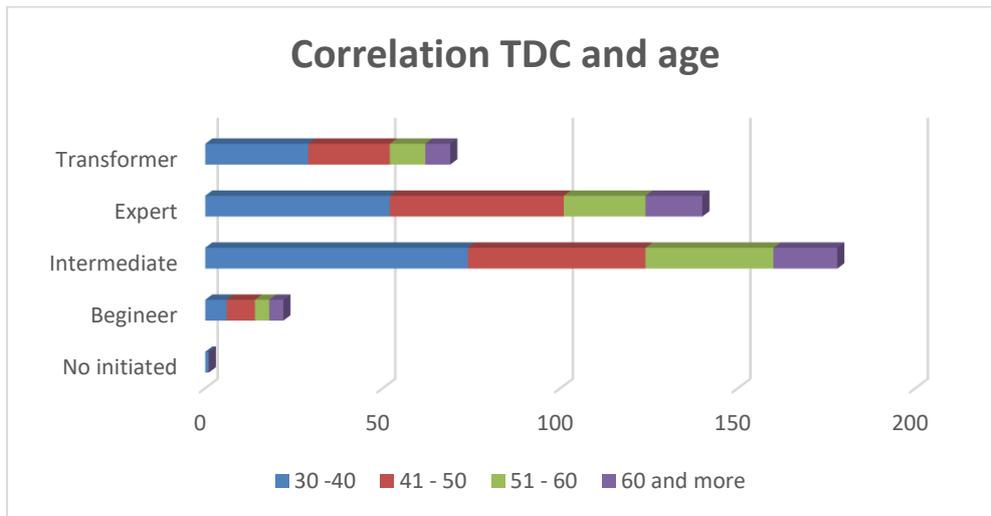
3.6 Correlational analysis of TDC and other variables

In order to accomplish the correlational analysis of the teacher digital competence with research factors (age, gender, university faculty and type of contract), non-parametric tests were applied according to the nature of the variables.

3.6.1 Correlation TDC and age

A Kruskal-Wallis test was applied to confirm that at least one group of age is different from others in D1 and D2, obtaining a value of $p > 0.05$. For group of ages 39-45 there are significant statistical differences in D3. This group also shows higher results of the average score ($p=0.03$) when display knowledge and respect for documents and protocols that are part of the digital space. At the same time this group of age revealed a significant difference ($p=0.02$) in D4 regarding the use of desk or web applications to manage the virtual class content in the virtual learning environment.

Figure 4.
Correlation digital auto-perception competence and age



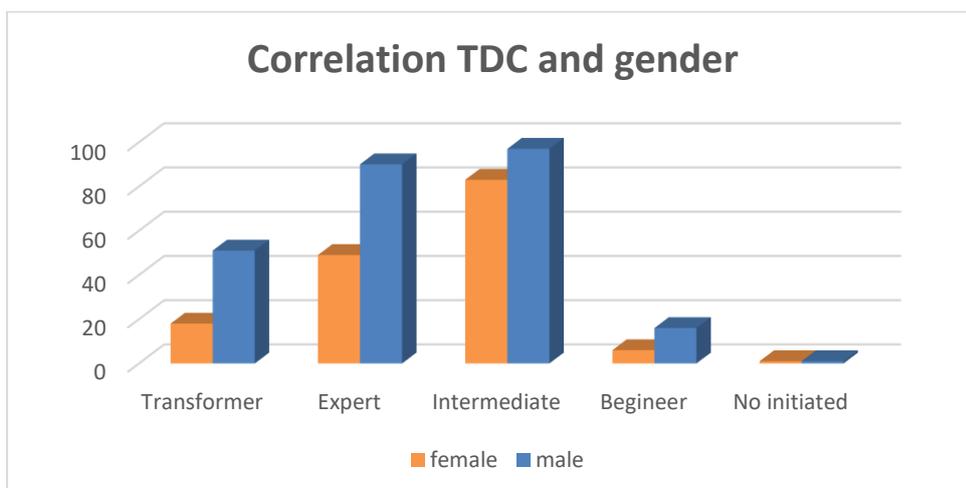
Source: authors' elaboration

3.6.2 Correlation TDC and gender

Results indicate that male teachers acquired higher score than female teachers at beginners, expert and transformer levels. For not initiated level male and female obtained the same scores. By dimensions also male teachers showed higher scores than female teachers in D2, that is related to the use of digital technologies available in the virtual environment ($t [354] = 2.82, p=0.005$).

D3 revealed higher results in male teachers than female teachers ($t [363] = 3.83, p=0.000$) regarding author's rights from documents about the use of technology and when dealing with ethical and responsible use of technologies. In D4 male teachers obtained an upper average score ($t [372] = 2.19, p=0.029$) in comparison with female teachers when sharing resources and materials available in the web.

Figure 5.
Correlation digital auto-perception competence and gender



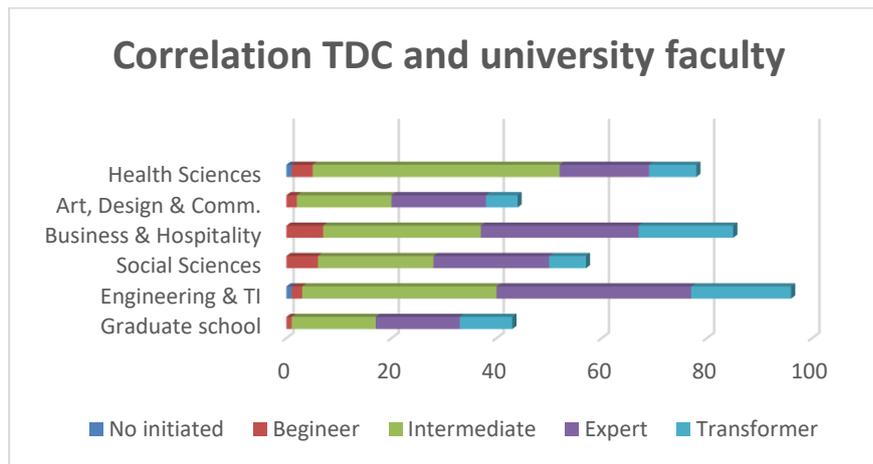
Source: authors' elaboration

3.6.3 Correlation TDC and university faculty

Teachers from Engineering and Information Technology schools and Graduate school (Business Administration, Project Management, Education, Psychology and Law) received higher results according to transformer and expert levels, while teachers from Health Sciences and Business/ Hospitality schools scored in intermediate level. For beginner level Business/Hospitality have the majority of teachers and for the not initiated level Health Sciences and Engineering/Information Technology obtained the same quantity of teachers at this level.

Figure 6.

Correlation digital auto-perception competence and university faculty



Source: authors' elaboration

Kruskal-Wallis test showed that Engineering and Information Technology has a significant difference in D1 ($p=0.003$), D2 ($p=0.004$), D3 ($p=0.000$) and D4 ($p=0.002$) in regard to Business/Hospitality and Health Sciences faculties. Furthermore, there is not significant difference in D1 ($p=0.44$) and D2 ($p=0.12$) when comparing Art/ Design/Communication, Social Sciences and Graduate School, but for D3 and D4 null hypothesis is rejected since not all population median are equal and the university faculty that present a significant difference is Graduate School with D1 ($p=0.02$) and D2 ($p=0.04$).

Data in table 2, Engineering and Information Technology and Graduate School obtained the highest median in all dimensions, which is consistent with the overall scores.

Table 5.

Kruskal-Wallis Test D1 vs. university faculty

University faculty	n	median
Health Science	78	54.17
Art, Design and Communication	44	64.58
Business & Hospitality	100	58.33
Social Sciences	59	62.50
Engineering & TI	88	66.67
Graduate School	44	66.67

Kruskal-Wallis Test D2 vs. university faculty

Health Science	78	45.00
Art, Design and Communication	44	57.50

Business & Hospitality	100	50.00
Social Sciences	59	50.00
Engineering & TI	88	60.00
Graduate School	44	60.00

Kruskal-Wallis Test **D3** vs. university faculty

Health Science	78	35.00
Art, Design and Communication	44	40.00
Business & Hospitality	100	40.00
Social Sciences	59	40.00
Engineering & TI	88	50.00
Graduate School	44	52.50

Kruskal-Wallis Test **D4** vs. university faculty

Health Science	78	37.50
Art, Design and Communication	44	45.83
Business & Hospitality	100	45.83
Social Sciences	59	41.67
Engineering & TI	88	50.00
Graduate School	44	56.25

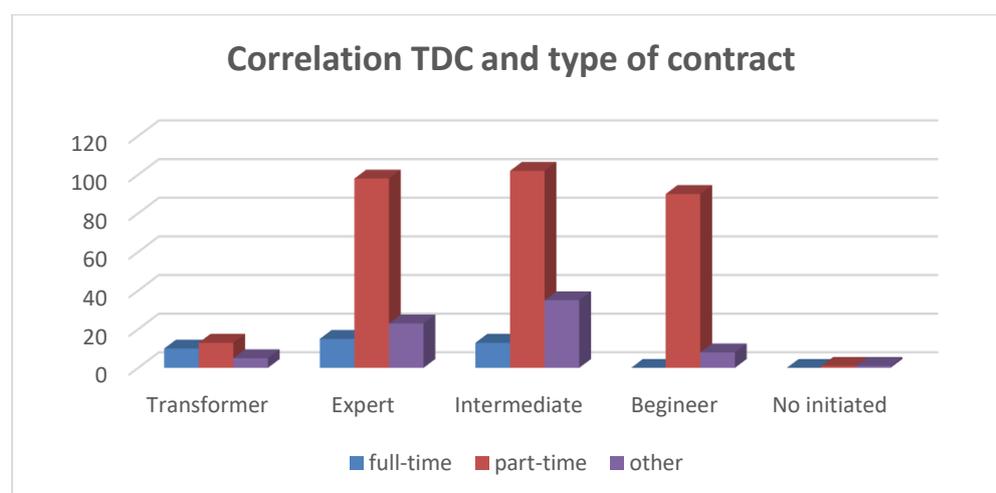
Source: authors' elaboration

3.6.4 Correlation TDC and type of contract

There were no differences in teachers' self-perception scores by type of contract when a Kruskal-Wallis test was applied. The analysis concludes that there are no significant differences regarding type of contract and the dimensions evaluated, given that the p value in all cases was greater than 0.05 (D1, p=0.107; D2, p=0.503; D3, p=0.684 and D4, p=0.696), since digital competence does not seem to be affected by issues of permanence.

Figure 7.

Correlation digital auto-perception competence and type of contract



Source: authors' elaboration

4. DISCUSSION AND CONCLUSION

The purpose of this study was to identify teacher's self-perception of TDC and correlate the results with variables such as age, gender, university faculty and type of contract. The findings revealed that teachers perceived their TDC at an intermediate level, aligning with other studies that report adequate or acceptable levels of TDC (Palau et al. 2019; Silva et al. 2019; Esteve-Mon et al. 2020; Paz-Saavedra et al. 2022; Zúñiga et al. 2021, Liesa-Orus et al. 2023, Martín-Párraga et al. 2023, Rojas-Osorio et al. 2024).

Regarding age, younger teachers achieve the highest levels with high scores, while those aged 61 and older remain at the beginner level with lower results, aligning with the finding of Palau et al. (2019), López et al. (2020), Guerrero et al. (2020), Paz-Saavedra et al. (2022), and Fernández-Morante et al. (2023). Interestingly, teachers that are the youngest registered having apps knowledge and used technological resources, however teachers with ages between 39 – 45 showed expertise and adaptation of teaching process in times of COVID-19 pandemic, obtaining scores that are adequate with superior skills for the use of technologies (Cabero et al. 2020, Rojas-Osorio et al. 2024).

In relation to gender, the results showed that male teachers gain a higher score at all levels than female teachers (Grimalt-Alvaro et al. 2020) that perceived themselves as less digital competent than males. Other studies found no significant difference between men and women (Pozo et al. 2020, Usart et al. 2021, Paz-Saavedra et al. 2022, Fernández-Morante et al. 2023, Rojas-Osorio et al. 2024).

The university faculty factor does not affect TDC, being more obvious in teachers from Engineering and Information Technology schools, since they become digitally literate because of their careers (Starkey and Yates, 2023). Digital competence perceived by other professors from Graduate School, including Business Administration, Project Management, Education, Psychology and Law, confirmed that there is no relation between teachers' university faculty and self-perception of digital competences, which is consistent with outcomes from Dias-Trindale and Albuquerque (2022). In addition, there is not significant differences between TDC and the type of contract, similar to results found in other studies (Mora-Cantalops et al. 2022) with a full-time category (77.3%) in contrast to part-time teachers (22.7%).

The analysis by dimensions reveals a significant difference between D3 and D4 compared to D1 and D2, with the former two being associated with relationships, ethics, security, and both personal and professional aspects. These finding contract with those of Paz-Saavedra et al (2022), where D1 was identified as the highest in teachers 'perception of didactics, curriculum, and methodology.

In reference to the correlation between self-perception of TDC and the university faculty, the analysis indicates that in general there are no significant differences in D1, D2 and D3, resulting in teacher not focused in planification and organization, use of technology, on the contrary teachers showed significant difference in D4 due to an interest for improving teaching practice and personal growth. A further examination revealed a significant difference among Engineering/Information Technology and Business/Hospitality and Health Sciences in all dimensions. The comparison results of Art/Design/Communication, Social Science and Graduate School showed no difference in D3 and D4, but in D1 and D2 the difference is represented by the Graduate School, a fact that is in line with previous research from Dias-Trindade and Albuquerque (2022), Starkey and Yates (2023) that found no relation between teachers 'university faculty and the level of digital competences.

Teachers 'self-perception of their digital competences has provided valuable insights into the skills levels of the teaching staff at the Universidad Latina. Using the COMDID-A instrument, it was found that most

participating teachers perceived themselves at an average level. This suggests they use digital technologies to improve the teaching-learning process and adapt to the educational context, but do not fully integrate or explore additional tools to promote meaningful learning. These findings are comparable to a study conducted in Spanish and Latin American universities (Mora-Cantalops, 2022, Liesa-Orus et al. 2023) where most teachers demonstrated a B1 level of digital competence, with a urgent need to adapt to a postmodern reality. Similar to the present study, they used technology but lacked deeper understanding of which tools to employ across various methodological strategies.

Additionally, this aligns with other research highlighting the generally low level of digital skills among teachers (Cabero et al. 2022, García et al. 2023). In terms of gender, the findings are consistent with previous studies (Grimalt-Álvaro et al. 2020) indicating that male teachers tend to have a higher self-perception of their TDC compared to female teachers. This trend is also reflected in the average scores across dimensions, which favor male educators.

Age was another factor analyzed in this study, and the findings align with previous research showing that teachers over 61 years of age tend lower self-perceptions of their digital competences. This suggests that younger teachers generally report higher self-perceptions scores. This study also examined whether the university faculty in which teachers work influence their self-perceptions of TDC. Results indicate that faculty from the Engineering-IT schools and Graduate School programs achieved the highest scores, followed by Art, Design and Communication faculty, then the Business and Hospitality faculty, with the Social Sciences and Health Sciences faculties reporting the lowest scores. These findings differ from those of Mora-Cantalops study (2022), who reported the highest self-perception levels in Social Sciences, Arts and Humanities, followed by Engineering and Architecture, and the lowest in Sciences and Health Sciences. Mora-Cantalops also highlighted those postgraduate professors demonstrated higher self-perception of digital competences than undergraduate professors across various disciplines.

As a result of the correlation that exists between the self-perception of the dimension of the TDC and the university faculty, no significant difference is found between them; however, in general, the data showed that the perception that teachers have of their digital competence, is their focus on issues associated with the personal and professional, leaving the other dimensions in the background. This denotes the relevance of the creation and implementation of actions that provide support to teachers in the incorporation of ICT into the teaching-learning processes, that improves competency appreciation, as well as the creation of a pedagogical model for the development of digital skills in teachers. It is the task of higher education institutions to continue the training of teachers' digital skills through the accreditation of knowledge (IDB, 2020), which provides possibilities for development and continuity of the teaching career.

This study is limited to teachers at a university in Costa Rica, with the sample population determined by their willingness to participate and provide self-reported data on their digital competencies. Additionally, it is important to note that this assessment is based on teachers' self-perception, which may differ from evaluations conducted through direct observation of teaching practice or from the perspective of students.

As implications of this evaluation, there is a need to execute training strategies that cover all the dimensions and considerations of COMDID-A, so that they are explored and evaluated in greater detail during the teaching exercise. A recommendation is to perform a detailed analysis of the result of the

dimensions according to the university faculty to which the teacher belongs, as well as whether there are differences in gender of the same unit and years of teaching experience.

Based on the findings of this study, the following recommendations are proposed to further investigate and address teacher's digital competencies (TDC) in higher education. It is essential to develop training programs that cover all dimensions of the COMDID-A framework, with particular emphasis on strengthening teacher's pedagogical and methodological use of digital tools. Specialized training should be provided for faculties with lower digital competence scores, including Social Sciences and Health Sciences, to bridge the gap in digital proficiency.

Additionally, initiatives should be implemented to promote gender-sensitive approaches in training programs that consider diverse learning styles and experiences. These efforts, will empower female educators in the use of digital technologies.

Collaboration and knowledge-sharing between faculties are highly recommended, through activities such as workshops, and hands-on practice with various digital toolkits. Conducting in-depth analyses of TDC by faculty is also suggested to design faculty-specific training models.

The university should establish a digital competence enhancement policy to promote continuous learning and adaptation to emerging technologies. It should offer recognition and incentives for teachers who actively engage in digital upskilling and develop a digital competence certification program to formally acknowledge teachers' progress and expertise.

Finally, it is recommended to conduct longitudinal studies to assess the long-term impact of digital competence, incorporating comparisons with studies from other universities in diverse contexts. These studies should include mixed-method approaches as direct observations, student feedback and focus groups. Further research should explore the relationship between digital competence and teaching effectiveness, student engagement, and learning outcomes.

The authors declare no conflicts of interest.

8. REFERENCES

- Amaya, A.; Zúñiga, E.; Salazar, M. & Ávila, A. (2018). Empoderar a los profesores en su quehacer académico a través de certificaciones internacionales en competencias digitales. *Apertura* (Guadalajara, Jal). (10)1. <https://doi.org/10.32870/ap.v10n1.1174>
- Belmonte, J., Pozo, S., Vázquez, E., López, E.J. (2020). Análisis de la incidencia de la edad en la competencia digital del profesorado preuniversitario español. *Revista Fuente*, 75-87. <https://doi.org/10.12795/revistafuentes.2020.v22.i1.07>
- Cabero-Almenara, J., Barroso-Osuna, J., Rodríguez-Gallero, M., Palacios-Rodríguez, A. (2020). La competencia digital docente. El caso de las universidades andaluzas. *Aula Abierta*, 4(49), 363-372. <https://dialnet.unirioja.es/servlet/articulo?codigo=7704699>
- Cabero-Almenara, J., Valencia-Ortiz, R., & Palacios-Rodríguez, A. (2022). E-learning in times of COVID-19. What have we learned? *IJERI: International Journal of Educational Research and Innovation*, (17), 14–26. <https://doi.org/10.46661/ijeri.6361>
- Dias-Trindade, S. and Albuquerque, C. (2022). University Teachers' Digital Competence: A case Study from Portugal. *Social Sciences*, 11(10), 481 <https://doi.org/10.3390/socsci11100481>

- Estela-Dávila, R.I., Rivera-Arellano, E.G., Pérez-Díaz, I., Méndez-Vergaray, J. & Flores, E. (2022). Competencias digitales docentes en la Educación a Distancia durante la Covid-19. *Revista Científica Arbitrada Multidisciplinaria PENTACIENCIAS*. 4(6), 27-43.
<https://www.editorialalema.org/index.php/pentaciencias/article/view/330>
- Esteve-Mon, F.M.; Llopis-Nebot, M.A. & Adell-Segura, J. (2020). Digital Teaching Competence of University Teachers: A Systematic Review of the Literature. *Revista Iberoamericana de Tecnologías del Aprendizaje*, 15(4), 399-406. [10.1109/RITA.2020.3033225](https://doi.org/10.1109/RITA.2020.3033225)
- Fernández-Morante, C., Cebreiro López, B., Casal-Otero, L. & Mareque León, F. (2023). Teachers' Digital Competence. The Case of the University System of Galicia. *Journal of New Approaches in Educational Research*, 12(1), 62-76 <https://doi.org/10.7821/naer.2023.1.1139>
- García, M.; Morales, M.J.; Gisbert, M. (2023). Estudio exploratorio acerca de la autopercepción del Desarrollo de la Competencia Digital Docente en la Universidad Tecnológica del Uruguay. *REDU Revista de docencia universitaria*, 21(2), 83-100. <https://doi.org/10.4995/redu.2023.19849>
- Grimalt-Álvaro, C., Usart, M., Esteve-González, V. (2020). La competencia digital docente en la formación continua del profesorado desde una perspectiva de género: estudio de caso. En: Roig-Vila, Rosabel (ed.). *La docencia en la Enseñanza Superior. Nuevas aportaciones desde la investigación e innovación educativas*. Barcelona: Octaedro. 214-224
<http://rua.ua.es/dspace/handle/10045/110180>
- Guerrero Moreno, J.A., Fernández Mora, M.A. & Godino Fernández, A.L. (2020). Competencia digital Docente. Área de información y alfabetización informacional y su influencia con la edad. *Revista de Investigación en Ciencias Sociales y Humanidades*, 7(1), 45-57
<http://dx.doi.org/10.30545/academo.2020.ene-jun.5>
- Hernández-Sampieri, R., Fernández, C. & Baptista, P. (2014). *Metodología de la investigación* (6a. ed.) McGraw-Hill.
- Hinojo-Lucena, F.J., Aznar-Díaz, I., Cáceres-Reche, M.P., Trujillo-Torres, J.M., Romero-Rodríguez, J.M. (2019). Factors influencing the Development of digital competence in Teachers: Analysis of the teaching staff of permanent education centres. *IEEE Access*, 7, 178744-178752.
[10.1109/ACCESS.2019.2957438](https://doi.org/10.1109/ACCESS.2019.2957438)
- Informe Estado de la Educación (2021). Octavo Estado de la Educación 2021/Programa Estado de la Nación. San José, CR. CONARE. <https://repositorio.conare.ac.cr/handle/20.500.12337/8152>
- ISTE (2022). Estándares ISTE. <https://iste.org/iste-certification>
- Lázaro-Cantabrana, J. L. (2015). La competència digital docent com a eina per garantir la qualitat en l'ús de les tic en un centre escolar. *TDX (Tesis Doctorals en Xarxa)*.
<https://www.tdx.cat/handle/10803/312831>
- Lázaro-Cantabrana, J. L., Gisbert-Cervera, M., & Silva-Quiroz, J. E. (2018). Una rúbrica para evaluar la competencia digital del profesor universitario en el contexto latinoamericano. *Revista Electrónica De Tecnología Educativa*, (63), 1-14. <https://doi.org/10.21556/edutec.2018.63.1091>
- Liesa-Orus, M., Lozano, R., Arce-Romeral, I. (2023). Digital competence in University Lectures: A Meta- Analysis of Teaching challenges. *Education Sciences*, 13(5), 508.
<https://doi.org/10.3390/educsci13050508>
- López Belmonte, J. Pozo Sánchez, S., Vázquez Cano, E. & López Meneses, E. (2020). Análisis de la incidencia de la edad en la competencia digital del profesorado preuniversitario español. *Revista Fuentes*, 22 (1), 75-78 <https://doi.org/10.12795/revistafuentes.2020.v22.i1.07>
- Martín-Cuadrado, A.M, Lavandera-Ponce S.; Mora-Jauregualde B, Sánchez-Romero C. & Pérez-Sánchez, L. (2021). Working Methodology with Public Universities in Peru during the Pandemic—

- Continuity of Virtual/Online Teaching and Learning. *Education Sciences*, 11(7) 351
<https://doi.org/10.3390/educsci11070351>
- Martín-Párraga, L., Llorente-Cejudo, C., Barroso-Osuna, J. (2023). Self-perception of digital competence in University Lectures: A comparative study between Universities in Spain and Perú. *Societies*, 13(6), 142 <https://doi.org/10.3390/soc13060142>
- Mora-Cantalops, M., Inamorato dos Santos, A., Villalonga-Gómez, C., Lacalle, J.R., Camarillo, J., Sota, J.M., Velasco, J.R. & Ruiz, P.M. (2022). Competencias digitales del profesorado universitario en España. Un estudio basado en los marcos europeos DigCompEdu y OpenEdu, EUR 31127 ES, *Publications Office of the European Union*, Luxembourg.
<https://publications.jrc.ec.europa.eu/repository/handle/JRC129320>
- Palau, R., Usart, M. & Ucar, M.J. (2019). The digital competence of teacher in music conservatories. A study of self-perception in Spain. *Revista Electronica de LEEME*, 44, 24-4.
<http://dx.doi.org/10.7203/LEEME.44.15709>
- Paz-Saavedra, L.E., Gisbert, M., Usart-Rodríguez, M. (2022). Competencia digital docente, actitud y uso de tecnologías digitales por parte de los profesores universitarios. *Pixel-Bit. Revista de Medios y Educación*, 63, 93-130 <https://doi.org/10.12795/pixelbit.91652>
- Pozo Sánchez, S., López Belmonte, J., Fernandez Cruz, M. & López Núñez, J.A. (2020). Análisis correlacional de los factores incidentes en el nivel de competencia digital del profesorado. *Revista Electrónica Interuniversitaria de Formación del Profesorado*, 23(1), 143-159
<https://doi.org/10.6018/reifop.396741>
- Rojas-Osorio, M.; Del-Aguila-Arcentales, S.; Alvarez-Risco, A. (2024). Self-perception of University Teachers on their digital teaching competence. the case of Peru. *Journal of Applied Learning & Teaching*, 7(1). <http://journals.sfu.ca/jalt/index.php/jalt/index>
- Silva, J. Morales, M.J.; Lázaro, J.L; Gisbert, M.; Miranda, P.; Rivoir, A. & Onetto, A. (2019). La competencia digital docente en formación inicial: Estudio a partir de los casos de Chile y Uruguay. *Archivos Analíticos de Políticas Educativas*, 27(93).
<https://doi.org/10.14507/epaa.27.3822>
- Starkey, L., Yates, A. de Roiste, M. (2023). Each discipline is different: teacher capabilities for future-focused digitally infused undergraduate programmes. *Education Tech Research Dev.* 71, pag. 117-136 [10.1007/s11423-023-10196-2](https://doi.org/10.1007/s11423-023-10196-2)
- UNESCO (2019). *Marco de Competencias de los Docentes en materia de TIC*.
<https://unesdoc.unesco.org/ark:/48223/pf0000371024>
- Usart, M.; Lázaro, J.L. & Gisbert, M. (2021). Validación de una herramienta para autoevaluar la competencia digital docente. *Educación XXI*, 24(1), 353-373.
<http://doi.org/10.5944/educXX1.27080>
- Vásquez, M.S.; Roig-Vila, R., & Pañafiel, M. (2021). Teacher's digital competencies. A Systematic Review in the Latin-American context. *International Journal on Advanced Science, Engineering and Information Technology*, 11(6), 2495-2502. [h https://doi.org/10.18517/ijaseit.11.6.12542](https://doi.org/10.18517/ijaseit.11.6.12542)
- Vega, C.A., Sánchez, M., Rosano, G., & Amador, S.E. (2021). Competencias docentes, una innovación en ambiente virtuales de aprendizaje en educación superior. *Apertura* 13(2), 6-21.
<https://doi.org/10.32870/ap.v13n2.2061>
- Vicentini, I.C. (2020). La educación superior en tiempos de COVID-19: Aportes de la Segunda Reunión del Diálogo Virtual con Rectores de Universidades Líderes de América Latina. *BID Publicaciones*.
<http://dx.doi.org/10.18235/0002481>

Zúñiga, M., Núñez, O.; Matarrita, S. & Picado, K. (2021). *Competencias digitales de los docentes: desafíos y ruta de acción para lograr un uso efectivo y sostenido de las TIC al servicio del mejoramiento educativo*. CONARE <https://bit.ly/3g9tM6b>

INFORMATION ABOUT THE AUTHORS

Aleida Chavarría

Universidad Latina de Costa Rica

Aleida Chavarría is a Professor at the Graduate School and Dean of Social Sciences of Universidad Latina de Costa Rica with a Bachelor degree in Preschool Education from Universidad Nacional of Costa Rica, a Master of Science from East Carolina University and active student of the Doctorate program Educational Technology, Universidad Rovira i Virgili from Tarragona, Spain. She has taught several undergraduate and postgraduate courses from the School of Education. She has been involved in the research area, addressing studies about the use of platform technologies, teacher digital competences, hybrid learning environments, remote teaching, bilingualism in early childhood education and participated in various national and international conferences. Being the main fields of investigation the sciences of the educational, pedagogy and social sciences, she publishes scientific articles with a ORCID registered <https://orcid.org/0000-0003-4577-7262>

Ramon Palau

Universidad Rovira i Virgili

He has a doctorate in Educational Technology and works as a researcher and professor at the Rovira i Virgili University. His research work is carried out within the ARGET research group, focused on educational technology and its applications in teaching and learning processes. Throughout his career, he has actively contributed to various projects and has taken on the role of principal investigator in two competitive research projects.

The author's research covers three different lines. First, it explores topics related to the concept of the Smart Classroom. The second line of research delves into the Flipped Classroom and Flipped Learning, along with their evolution. The last line of research focuses on the evaluation of teachers' digital competence. The results of these investigations are disseminated through the publication of more than 80 articles.

ORCID registered <https://orcid.org/0000-0002-9843-3116>

Raúl Santiago

Universidad de la Rioja

Raul Santiago is a Doctor of Educational Sciences from the University of Navarra. Currently, he is tenured professor (on leave) of the Area of Didactics and School Organization at the University of La Rioja. He has been the director of the Multimedia Resources Area and the Higher Language Center of the Public University of Navarra. He is a professor in the degrees of Social Education, Pedagogy, and Psychology at the National University of Distance Education (UNED). He is the author and co-author of several books and is the coordinator of the worldwide research group on the Flipped Learning model. He collaborates with various educational institutions in Chile, Argentina, Panama, Ecuador, Mexico, Guatemala, Costa Rica, Peru and the United States in advising on the implementation of methodological and didactic transformation programs. He is currently the director of Learning and Development of 3PBiovia, developing his work in corporate training.

ORCID registered <https://orcid.org/0000-0002-1256-5338>



The texts published in this journal are subjected under a Attribution-Non Commercial-ShareAlike 4.0 Spain. You can copy them, distribute them, communicate them publicly and make derivated work as long as it recognizes work credits (authorship, journal's name, publishing institution) in the specified way by the authors or by the journal. The complete license can be checked on: [Attribution-NonCommercial-ShareAlike 4.0 International \(CC BY-NC-SA 4.0\)](https://creativecommons.org/licenses/by-nc-sa/4.0/).