



International Journal of Learning, Teaching and Educational Research
Vol. 24, No. 1, pp. 298-314, January 2025
<https://doi.org/10.26803/ijlter.24.1.15>
Received Nov 18, 2024; Revised Jan 14, 2025; Accepted Jan 23, 2025

Exploring Digital Competence among Higher Education Teachers: A Systematic Review

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Abstract. Digital competency has grown increasingly vital for teachers in the modern classroom. While much attention has been given to pre-university education, university teachers are now beginning to recognise the importance of mastering digital competencies, which can be described as a combination of skills, attitudes, and knowledge necessary for effective technology use in teaching. This systematic review examines existing research on university teachers' digital competencies, drawing from studies that explore their challenges, practices, and needs. A recurring theme in the reviewed literature is the limited use of advanced digital tools, primarily due to barriers such as insufficient training, a lack of time, and inadequate resources. These constraints often lead educators to rely on basic digital tools, leaving significant potential for untapped innovation. The findings underscore the critical need for structured training programmes that integrate pedagogy and technology so that faculty may easily adopt innovative teaching strategies and enhance student learning outcomes. This review highlights the most relevant studies to emphasise the need for long-term strategies in aiding the development of digital competencies. By addressing these gaps, universities can better prepare their educators to navigate the evolving digital landscape, ultimately improving the quality of higher education. The study provides actionable insights for institutional policymakers with a goal to foster digital transformation in teaching and learning.

Keywords: digital competencies; higher education; systematic review; teachers; university teachers

1. Introduction

In the rapidly evolving landscape of education, the integration of information and communication technologies (ICT) has become essential for enhancing teaching and learning processes. Higher education institutions are tasked with preparing students to thrive in a digitalised world by embracing technological advancements, which requires a strategic approach. Digital competency – the

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ability to effectively use digital tools and resources for communication, collaboration, and learning – has emerged as a crucial skill for educators (Starkey, 2020). The ability to navigate and leverage technology is not just a supplementary skill but a necessity for university teachers who shape the learning experiences of future professionals (Esteve-Mon et al., 2020).

Despite its growing importance, much of the existing research on digital competency has focused on pre-university education. While school-level teachers benefit from established frameworks and targeted training programmes, there is significantly less material available on the digital competencies of university teachers. University faculty face unique challenges, including the need to adapt teaching practices to diverse learning environments, utilise advanced digital tools, and overcome barriers such as limited training opportunities and institutional support (Ilomäki et al., 2016; Zhao et al., 2021). As a result, many teachers struggle to effectively integrate technology into their pedagogical practices.

While much research has been conducted on digital competencies at the K-12 level, higher education teachers face unique challenges that remain underexplored. As these instructors play a pivotal role in preparing students for the demands of a digitalised world, it is imperative to address this gap. Without targeted interventions, the digital divide in higher education could widen, further impacting teaching quality and student outcomes.

This systematic review addresses these gaps by examining the existing body of literature on university teachers' digital competencies. Specifically, it identifies the barriers educators face, explores strategies proven effective in overcoming these obstacles, and offers actionable recommendations for improving digital skills in higher education. By synthesising findings from prior studies, this research highlights the significance of digital competency for university teachers and provides insights for policymakers, administrators, and researchers into the quality of higher education in the digital age (Basilotta-Gómez-Pablos et al., 2022; Muñoz-Repiso & Tejedor, 2010).

2. Methodology

2.1 Research Design

This study employed a **systematic review design** to synthesise existing research on university teachers' digital competencies. A systematic review is a comprehensive, transparent, and replicable method for identifying, selecting, and critically appraising relevant studies to answer specific research questions (Moher et al., 2010). This approach was chosen because it allows for the integration of findings across multiple studies, providing a holistic understanding of the current state of knowledge and identifying gaps for future research. Adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines ensured rigour and consistency throughout the review process.

2.2 Search Strategy

A thorough search of five academic databases (Scopus, Web of Science, EBSCO, Google Scholar, and Ovid) was conducted to identify studies related to university teachers' digital competencies. The search terms included combinations such as "digital competence", "digital literacy", "ICT competence", and "university teacher". Boolean operators were used to refine results and ensure comprehensive coverage of the topic. Table 1 outlines the specific search strategies applied to each database.

Table 1: Search strategy used in this study

No.	Database	Search strategy
1	Scopus	("digital competence*" OR "digital literacy*" OR "ICT competence*" OR "technology skill*" OR "digital skill*" OR "e-learning competence*" OR "21st-century skill*") AND ("university teacher*" OR "higher education teacher*" OR "academic staff" OR "faculty member*" OR "lecturer*" OR "professor*")
2	Web of Science	("digital competence*" OR "digital literacy*" OR "ICT competence*" OR "technology skill*" OR "digital skill*" OR "e-learning competence*" OR "21st century skill*") AND ("university teacher*" OR "higher education teacher*" OR "academic staff" OR "faculty member*" OR "lecturer*" OR "professor*")
3	EBSCO	("digital competence*" OR "digital literacy*" OR "ICT competence*" OR "technology skill*" OR "digital skill*" OR "e-learning competence*" OR "21st-century skill*") AND ("university teacher*" OR "higher education teacher*" OR "academic staff" OR "faculty member*" OR "lecturer*" OR "professor*")
4	Google Scholar	("digital competence" OR "digital literacy" OR "ICT competence" OR "technology skills" OR "digital skills" OR "e-learning competence" OR "21st century skills") AND ("university teachers" OR "higher education teachers" OR "academic staff" OR "faculty members" OR "lecturers" OR "professors")
5	Ovid	("digital competence*" OR "digital literacy*" OR "ICT competence*" OR "technology skill*" OR "digital skill*" OR "e-learning competence*" OR "21st century skill*") AND ("university teacher*" OR "higher education teacher*" OR "academic staff" OR "faculty member*" OR "lecturer*" OR "professor*")

2.3 Studies Selection

The process of study selection followed the PRISMA guidelines, ensuring transparency and reproducibility. Initially, all retrieved records were imported into EndNote to remove duplicates. Titles and abstracts were then screened for relevance based on the inclusion and exclusion criteria outlined in Table 2. Full-text articles of potentially eligible studies were then reviewed before their

inclusion was confirmed. The screening process is summarised below in the PRISMA flow diagram (Figure 1). It illustrates the number of records identified, screened, excluded, and included at each stage of the selection process.

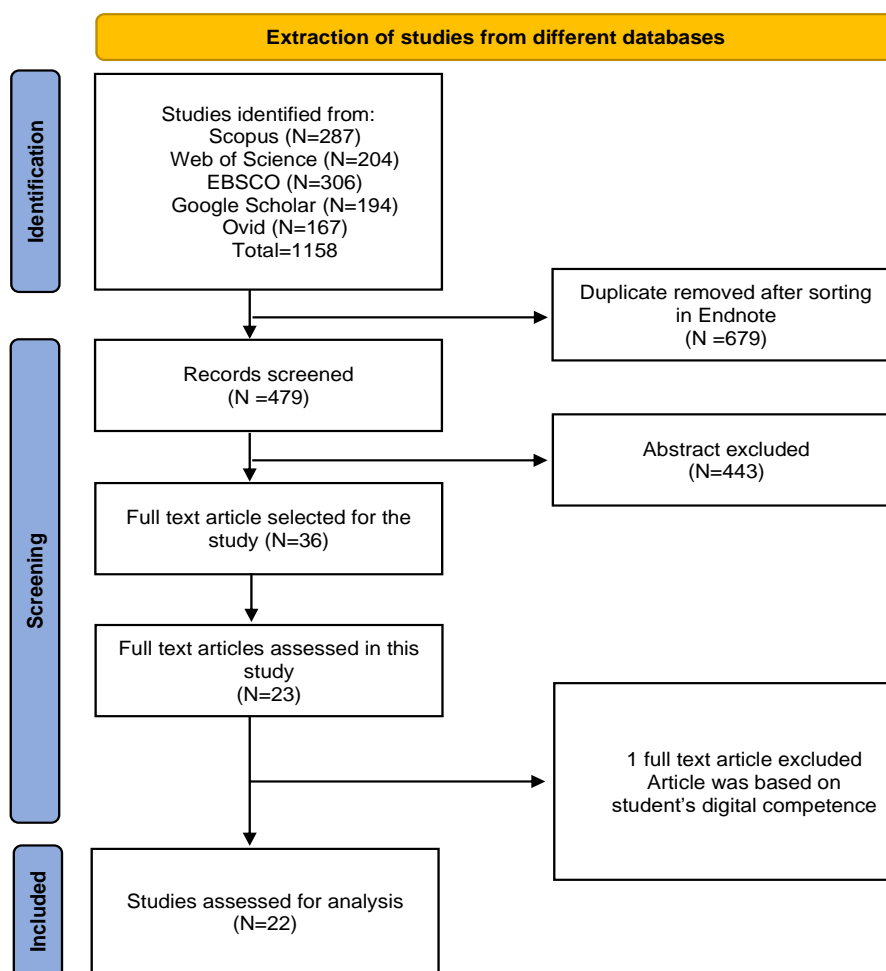


Figure 1: PRISMA flow chart for studies selection

2.4 Inclusion and Exclusion Criteria

The inclusion and exclusion criteria were carefully defined to ensure the relevance and quality of the selected studies. Studies were eligible if they:

- Examined digital competencies specifically among university teachers.
- Included empirical data (quantitative, qualitative, or mixed methods).
- Were published in Scopus- or Web of Science-indexed journals.

The inclusion criteria did not restrict studies based on publication year. While the field of digital competencies has evolved rapidly, older studies were included to provide a historical perspective and identify foundational trends in the development of university teachers' digital competencies. Excluding such studies would potentially dismiss insights that continue to influence the field today. Studies focusing on K-12 educators, non-teaching university staff, or students, as well as theoretical papers or opinion pieces, were excluded. Table 2 below summarises these criteria for clarity.

Table 2: Inclusion and exclusion criteria

Question element	Inclusion criteria	Exclusion criteria
Type of study	Quantitative studies, cohort studies, case-control studies, cross-sectional studies, and qualitative studies.	Opinion pieces, editorials, letters to the editor, book reviews, or purely theoretical papers without empirical data.
Activity	Studies that explore digital competencies, digital literacy, or ICT skills specifically among university or higher education teachers, faculty members, or academic staff.	Studies that do not specifically address digital competencies focus instead on unrelated aspects of education or technology use.
Population	Studies involving university teachers, professors, lecturers, or higher education instructors.	Studies focusing on K-12 teachers, non-teaching university staff, or students without a specific focus on university teachers.
Study language	Studies that were published in the English language or any other.	Studies that are not published in English.

Note: A Microsoft® Excel Spreadsheet was used to extract and store data and records (Microsoft, Inc., Redmond, Wash., USA). Older studies were included to provide historical context and foundational insights into the evolution of digital competencies in higher education.

2.5 Data Extraction and Analysis

Key information, including study design, population, key findings, and risk of bias, was obtained using a structured data extraction form. The Newcastle Ottawa Scale (NOS) was used to assess the risk of bias for each study. Studies were rated as low, medium, or high risk based on selection, comparability, and exposure criteria. The extracted data were synthesised to identify common themes and gaps in the literature, offering insights into the digital competencies of university instructors.

2.6 Risk Assessment

The quality of the included studies was assessed using the NOS, a widely recognised tool for evaluating the risk of bias in non-randomised studies. The NOS evaluates studies across three domains: **selection**, **comparability**, and **outcome/exposure**. Each study was assigned a score ranging from 0 to 9, with higher scores indicating a lower risk of bias. Based on these scores, studies were categorised with a low (7–9 stars), moderate (4–6 stars), or high (0–3 stars) risk of bias. A total of 22 studies were evaluated. Eight studies were classified with a low risk of bias, four studies with a high risk, and the remaining studies with a moderate risk. Common sources of bias included limitations in selection criteria and inconsistencies in reporting outcomes. Table 3 provides a detailed breakdown of the risk assessment scores for each included study.

Table 3: Risk of bias assessment in the studies included in this systematic review

Study	Selection				Comparability	Exposure		
	1.	2.	3.	4.	1.	1.	2.	3.
Suleimen (2019)	★	★			★★	★	★	★
Romero Alonso et al. (2019)	★	★			★	★	★	
Yang et al. (2022)	★	★				★	★	★
Pérez Díaz (2019)	★	★						★
Wang and Chu (2023)	★	★			★★	★	★	★
Mercader (2019)	★	★			★	★	★	★
Kotkova and Perminova (2019)	★	★			★★		★	★
Hidalgo Durán (2019)	★	★		★	★★	★	★	★
Barroso Osuna et al. (2019)	★	★	★		★		★	★
Ríos Ariza et al. (2018)	★	★			★★	★	★	★
Pérez et al. (2018)	★	★					★	
Tejada Fernández and Pozos Pérez (2018)	★	★			★★	★	★	★
Fernández-Márquez et al. (2018)	★	★			★	★	★	
Adarme et al. (2020)	★	★				★	★	★
Mercader and Sallan (2017)	★	★						★
Islim and Cagiltay (2016)	★	★			★★	★	★	★
Ruiz (2016)	★	★			★	★	★	★
Rodríguez Espinosa et al. (2014)	★	★			★★		★	★
Prendes Espinosa and Gutierrez Porlan (2013)	★	★		★	★★	★	★	★
Farrán and Rodríguez (2012)	★	★	★		★		★	★
Munoz Carril et al. (2011)	★	★			★★	★	★	★
Riascos-Eraza et al. (2010)	★	★					★	

Note: Selection criteria are based on the NOS. Numbers represent individual NOS criteria, and stars indicate quality ratings, with 1 star reflecting lower quality and up to 3 stars indicating high quality in the given domain.

The column 'Selection' in Table 3 refers to the criteria used for assessing the risk of bias in the study selection process and is based on the NOS. Each numbered item (1, 2, 3, etc.) corresponds to specific NOS criteria, such as sample representativeness, study design, or group comparability. Stars reflect the quality of the study for each criterion, with more stars indicating a lower risk of bias and higher methodological quality. This assessment highlights the methodological strengths and weaknesses of the reviewed studies, ensuring a balanced interpretation of the findings.

2.7 Data Collection

The data collection process adhered to a structured and systematic approach to ensure that only high-quality, relevant studies were included. Following the initial database searches, all records were imported into EndNote software (EndNote, 2015) to identify and remove duplicates. Two independent reviewers assessed the relevance of titles and abstracts through a detailed screening process based on the inclusion and exclusion criteria (see Table 2). Disagreements during this stage were resolved through discussion or consultation with a third reviewer.

For studies that met the initial screening criteria, full texts were retrieved and evaluated for eligibility. Key data were extracted using a predefined data extraction form designed to capture essential information, such as study design, sample size, geographical location, population characteristics, and key findings. This systematic approach ensured consistency and reduced the risk of bias in data collection (Karimi & Khawaja, 2023; Moher et al., 2010). Data were extracted into Microsoft Excel to facilitate organisation and analysis. Emphasis was placed on ensuring that all extracted data aligned with the objectives of the systematic review. To enhance transparency and replicability, studies excluded at this stage were documented with the reason for exclusion.

2.8 Data Analysis

Analysis was conducted using both qualitative and quantitative synthesis methods to provide a comprehensive understanding of the findings. Quantitative data were analysed descriptively to identify patterns, trends, and frequencies related to digital competencies among university teachers. This included an examination of study characteristics, such as the distribution of studies by country, methodologies used, and the key barriers identified. The findings were presented using tables and charts to aid interpretation (Karimi & Khawaja, 2023).

Qualitative data were thematically analysed with a focus on recurring themes and concepts related to digital competencies, barriers, and institutional strategies. Narrative synthesis was used to interpret the findings in the context of the existing literature and connections were drawn between the studies to identify areas of alignment and areas that differed. The thematic analysis followed a six-step process: familiarisation, coding, theme identification, theme review, theme definition and naming, and final synthesis (Braun & Clarke, 2006). This approach ensured that the analysis was both systematic and robust.

The NOS was used to assess the risk of bias in the included studies, and results from the risk assessment informed the interpretation of the findings. Moderate to

high-risk studies were carefully evaluated to ensure that their limitations were considered when synthesising the data (Moher et al., 2010). All analyses were conducted in accordance with PRISMA guidelines, ensuring methodological transparency and replicability.

3. Results

This systematic review synthesised findings from 22 studies examining university teachers' digital competencies. The results are organised into three subsections: characteristics of included studies, key findings and themes, and challenges to digital competency.

3.1 Characteristics of Included Studies

The reviewed studies employed various methodologies. Quantitative research was the most common methodology (45%), followed by qualitative (30%) and mixed methods approaches (25%). These findings indicate a strong reliance on data-driven methodologies in investigating digital competencies among university instructors. Geographically, the majority of studies originated from Spain (40%), followed by China (20%) and with smaller contributions from countries such as Turkey, Colombia, and Ecuador. This geographical concentration suggests a need for broader global representation in future research. Figure 2 illustrates the geographical distribution of the included studies, highlighting the dominance of Europe and East Asia.

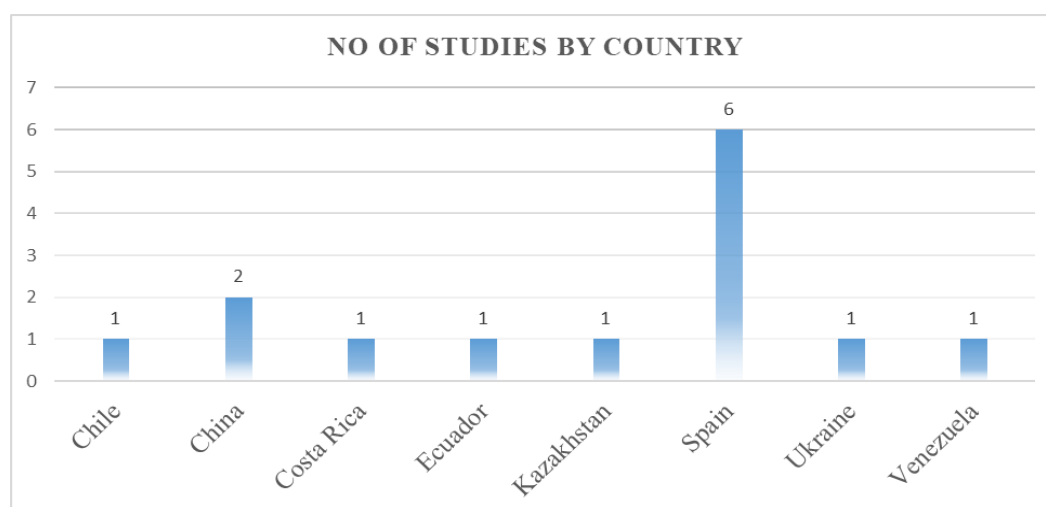


Figure 2: Distribution of studies by each country

Table 4 provides a detailed summary of the methodologies, geographical locations, and key findings of the included studies. This information complements the analysis by offering a succinct overview of the scope and focus of each study.

Table 4: Characteristics of included studies

Author(s)/ year of publication	Journal name	Study design	Country	Key findings
Suleimen (2019)	Journal of Information Technology Education: Research	Mixed methodology	Kazakhstan	The results note that teachers are positive about the use of ICTs but reveals that they mainly use multimedia presentation tools and do not use any advanced tools. Barriers include a lack of time, resources, and training.
Romero Alonso et al. (2019)	Digital Education Review	Qualitative study	Chile	Findings indicate the barriers that university teachers face in their practices when using ICTs, including insufficient training.
Yang et al. (2022)	Education and Information Technology	Qualitative study	China	The study offers suggestions for enhancing pre-service teachers' education in digital competence at universities and creating well-thought-out ICT training programmes for in-service teachers.
Pérez Díaz (2019)	Pixel-Bit, Revista de Medios y Educación	Quantitative Study	Spain	Results show that teachers are familiar with technological tools and Internet access, but have difficulties with other aspects, such as the creation of digital resources
Wang and Chu (2023)	Sustainability MDPI	Quantitative Study	China	It was discovered that teachers' digital competency and enabling conditions are mediated by self-efficacy. The results of this study offer implications for improving teachers' digital competency.
Mercader (2019)	Aula Abierta	Mixed Methodology	Spain	The study suggests that a lack of training, innovation, and time are some of the main factors that impede teachers' technology use
Kotkova and Perminova (2019)	Information Technologies and Learning Tools	Quantitative Study	Ukraine	Teachers say that more skills, strategies and time are needed to introduce ICT into education
Hidalgo Durán (2019)	Revista electrónica calidad en la educación superior	Qualitative study	Costa Rica	The use of ICT does not guarantee higher quality education but is intended to improve technical implementation and technical training for university teachers.

Barroso Osuna et al. (2019)	Revista Iberoamericana De Educación	Mixed Methodology	Spain	ICT is a powerful tool for building students' knowledge but requires proper teacher training and an appropriate teacher attitude. Training is often limited, and teachers show little initiative.
Ríos Ariza et al. (2018)	Píxel-Bit. Revista De Medios Y Educación	Qualitative study	Spain	The results show that university teachers are more competent in technological matters rather than in pedagogical ones.
Pérez et al. (2018)	Dilemas contemporáneos Educación, política y valores	Qualitative study	Ecuador	Findings conclude the need for ongoing university teacher training in digital skills and innovative teaching activities using ICT.
Tejada Fernández and Pozos Pérez (2018)	Profesorado	Qualitative study	Spain	The incorporation of ICT in education depends on the teacher's profile and their professional skills. Thus, a new model for integrating digital skills into university teaching is presented.
Fernández-Márquez et al. (2018)	Revista digital de investigación en docencia universitaria	Quantitative Study	Spain	Findings highlight the university faculty's perceptions of their use of ICTs, pointing to several factors that affect their use, such as lack of time, resources or training.
Adarme et al. (2020)	Logos, Ciencia & Tecnología	Qualitative study	Venezuela	Results indicate the limited knowledge of digital skills that university professors have in order to achieve significant learning in their students.
Mercader and Sallan (2017)	Revista de docencia Universitaria	Mixed Methodology	Spain	The results show that teachers mainly implement basic tools such as visual displays. In addition, the use of frequencies is very low. It is possible to link this trend to internal factors such as digital competence, age or experience.
Islim and Cagiltay (2016)	Journal of Mathematics, Science & Technology Education	Mixed Methodology	Turkey	The findings reveal that teachers have little training and experience in technology. Other barriers include the cost of computers and Internet access problems.
Ruiz (2016)	Revista de la Facultad de Educación de Albacete	Quantitative Study	Spain	The results demonstrate that university teachers have a positive attitude towards ICTs, but that their knowledge is very limited.
Rodríguez Espinosa et al. (2014)	Revista de la Educación Superior	Quantitative Study	Colombia	The need to improve teacher training is stated. Research shows that there is a greater knowledge of ICT among women and groups under 40.

Prendes Espinosa and Gutierrez Porlan (2013)	Revista de Educación	Quantitative Study	Spain	ICT skills are essential for teacher performance, although they are currently scarce.
Farrán and Rodríguez (2012)	Revista de Docencia Universitaria	Quantitative Study	Spain	Digital competence is an essential requirement for university teachers. Teachers are familiar with word processing programmes but not with creating and editing resources.
Munoz Carril et al. (2011)	Educación XXI	Quantitative Study	Spain	Teachers report training needs: most of their knowledge covers word processing or display programmes.
Riascos-Eraza et al. (2010)	Educación y Educadores	Quantitative Study	Colombia	Teachers show a positive opinion about ICTs due to the interest, training and support provided by these institutions regarding teacher training. This is mainly the case in private universities.

3.2 Key Findings and Themes

Thematic analysis revealed several recurring themes across the reviewed studies:

1. **Barriers to Digital Competency:**
 - Lack of training and professional development opportunities were cited in 70% of the studies.
 - Insufficient resources, such as limited access to advanced digital tools, were a common challenge.
 - Time constraints and institutional support were highlighted to be significant barriers (see Figure 3 below).
2. **Strategies to Enhance Competency:**
 - Effective training programmes tailored to educators' needs were recommended in most studies.
 - Some studies emphasised the role of self-efficacy and motivation in adopting digital technologies.
3. **Demographic and Contextual Factors:**
 - Younger educators and those with more teaching experience reported higher levels of digital competency.
 - Private institutions were more likely to provide adequate support compared to public universities.

3.3 Challenges to Digital Competency

Figure 3 below summarises the challenges faced by university teachers in developing digital competencies. These challenges include:

- Lack of institutional support (25% of studies).
- Limited funding for technological resources (20%).
- Inconsistent access to reliable internet infrastructure (10%).

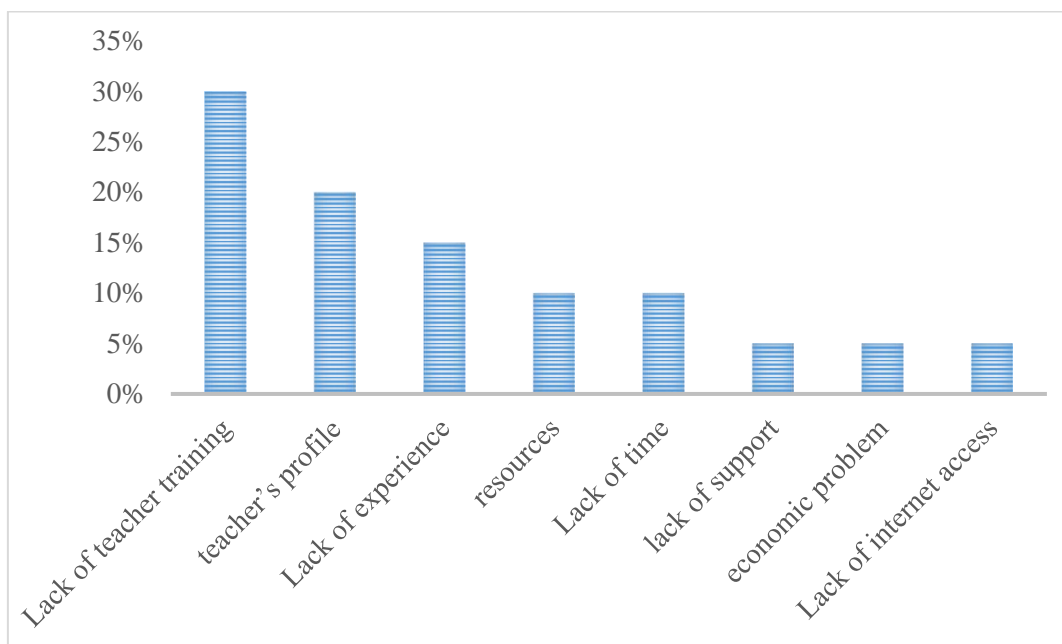


Figure 3: Challenges to teachers' digital competence development

4. Discussion

4.1 Summary of Major Findings

Overall, the findings highlight the barriers faced by university teachers when developing digital competencies. These results underscore the importance of tailored training programmes and institutional support to bridge the competency gap and enhance teaching and learning outcomes in higher education. They reveal significant barriers to digital proficiency, including limited training opportunities, insufficient resources, and institutional constraints. Geographically, the research on this topic was concentrated in Spain and China, indicating a lack of global representation. Quantitative methodologies dominate the reviewed studies, emphasising the need for diverse approaches to further explore this topic. These findings align with prior research indicating that digital competency remains a critical area for development in higher education (Esteve-Mon et al., 2020; Zhao et al., 2021).

4.2 Interpretation of Findings

The results underscore the complexity of digital competency development among university teachers. Limited training opportunities and insufficient institutional support are consistent with previous studies identifying similar barriers in higher education (Basilotta-Gómez-Pablos et al., 2022). The emphasis on basic digital tools, such as presentation software and over advanced technological applications highlight a significant gap between technological potential and actual classroom practice. This suggests that while university teachers recognise the importance of digital skills, systemic issues prevent them from fully integrating technology into pedagogy.

Interestingly, younger teachers and those from private institutions reported higher levels of digital proficiency, aligning with research indicating that access

to resources and institutional incentives significantly influence digital competency development (Riascos-Erazo et al., 2010; Rodríguez Espinosa et al., 2014). The geographical concentration of studies in Europe and East Asia may reflect disparities in research funding and technological infrastructure across regions, suggesting a need for more diverse studies to capture a global perspective.

4.3 Implications of Findings

The findings have significant implications for higher education policy and practice. First, tailored professional development programmes addressing teachers' specific needs and challenges are essential to bridge the digital competency gap. Institutions must allocate resources to training initiatives that integrate both pedagogy and technology, enabling instructors to adopt innovative teaching strategies. This aligns with prior recommendations that highlight the need for targeted interventions to enhance digital literacy among educators (Tejada Fernández & Pozos Pérez, 2018).

Furthermore, institutional support plays a pivotal role in fostering digital competency. Policies that prioritise access to advanced digital tools and provide incentives for adopting technology can significantly improve instructional quality. Such findings contribute to the growing body of literature on digital competencies and highlight the need for systemic approaches to address institutional and individual barriers.

4.4 Limitations and Recommendations

While this review provides valuable insights, several limitations should be noted. The inclusion of studies primarily from Europe and East Asia limits the generalisability of the findings to other regions. Future research should focus on underrepresented areas, such as Africa and South America, to develop a more comprehensive understanding of global trends. Additionally, the reliance on self-reported data in many studies may introduce bias, highlighting the need for more objective measures of digital competency. Despite these limitations, the findings remain valid and offer actionable recommendations. Universities should prioritise long-term strategies for digital competency development, including ongoing training programmes and institutional policies that promote technology integration. Collaborative research across institutions can further lead to effective interventions, addressing regional and contextual disparities in digital competency development.

5. Conclusion

The digital transformation of the education sector has placed increasing demands on university teachers to develop and apply robust digital competencies in their teaching practices. This systematic review synthesised findings from 22 studies to identify key barriers, strategies, and trends related to digital competency development among university faculty. The results revealed that while instructors recognise the importance of digital skills, systemic barriers—such as limited training opportunities, insufficient institutional support, and a lack of

access to advanced digital tools—continue to impede their ability to integrate technology effectively into pedagogy.

One of the major findings of this review is teachers' overreliance on basic digital tools, such as presentation software, with a limited use of advanced applications for collaborative and innovative teaching practices. This suggests a gap between technological advancements and their practical implementation in higher education settings. The review also highlighted significant disparities based on demographic and institutional factors, with younger instructors and those in private institutions demonstrating higher levels of digital proficiency. These findings align with previous research and emphasise the critical role of institutional support in fostering digital competency.

The geographical concentration of studies in Spain and China highlights an important limitation of the existing literature. While these studies provide valuable insights, they do not adequately represent global perspectives on digital competency development. This review underscores the urgent need for future research to explore underrepresented regions, such as Africa and South America, to develop a more comprehensive understanding of how contextual factors influence digital skill acquisition and application.

The implications of these findings are significant for higher education policymakers, administrators, and educators. First, institutions must prioritise the development of professional training programmes tailored to the specific needs and challenges of university instructors. These programmes should integrate pedagogy with advanced technology and provide hands-on experiences that enable faculty to adopt innovative teaching practices. Additionally, institutional policies should address structural barriers by allocating sufficient resources, improving access to digital tools, and fostering a culture of continuous professional development.

Despite its limitations, this review provides actionable insights that can guide future efforts to enhance digital competency in higher education. While the inclusion of studies primarily from Europe and East Asia limits the generalisability of the findings, the methodological rigour of this review ensures that the results are robust and valuable for advancing research and practice. Future studies should adopt mixed methods approaches and explore longitudinal interventions to examine how sustained training programmes influence digital skill development over time.

In conclusion, addressing the barriers to digital competency among university teachers is not merely a technical challenge but a systemic one that requires coordinated efforts at all levels of higher education. By equipping instructors with the necessary skills and resources, institutions can enhance the quality of teaching and learning, foster innovation and prepare students for the demands of an increasingly digitalised world.

6. Acknowledgments

The authors would like to thank editors and reviewers for their valuable comments and suggestions to improve the study.

Funding

This research received no external funding.

Institutional Review Board Statement

This study did not require ethical approval.

Informed Consent Statement

Not applicable.

Data Availability Statement

The authors confirm that the data that support the findings of this study are available on request from the corresponding author.

7. Conflicts of Interest

The authors declare no conflict of interest.

8. References

- Adarme, M. E. C., Sánchez, Z. C. N., & López, H. M. P. (2020). Interpretación de las competencias digitales profesoras presentes en el contexto universitario [Interpretation of the digital teaching competences present in the university context]. *Revista Logos, Ciencia & Tecnología*, 10, 41–51. <https://doi.org/10.22335/rict.v10i1.518>
- Barroso Osuna, J. M., Matos Alcántara, V. Y., & Aguilar Gavira, S. (2019). Análisis de los recursos, usos y competencias tecnológicas del profesorado universitario para comprender y mejorar el proceso de aprendizaje del alumnado [Analysis of the resources, uses and technological skills of university teaching staff to understand and improve the learning process of students]. *Revista Iberoamericana de Educación*, 80(1), 193–217. <https://doi.org/10.35362/rie8013466>
- Basilotta-Gómez-Pablos, V., Matarranz, M., Casado-Aranda, L.-A., & Otto, A. (2022). Teachers' digital competencies in higher education: A systematic literature review. *International Journal of Educational Technology in Higher Education*, 19, Article 8. <https://doi.org/10.1186/s41239-021-00312-8>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <http://dx.doi.org/10.1191/1478088706qp063oa>
- Esteve-Mon, F. M., Llopis-Nebot, M. Á., & Adell-Segura, J. (2020). Digital teaching competence of university teachers: A systematic review of the literature [Conference session]. *IEEE Revista Iberoamericana de Tecnologías del Aprendizaje*, 15(4), 399–406. IEEE. <https://doi.org/10.1109/RITA.2020.3008135>
- Farrán, F. X. C., & Rodríguez, J. L. C. (2012). Identificación de la competencia digital del profesor universitario: Un estudio exploratorio en el ámbito de las ciencias sociales [Identification of the digital competence of university professors: An exploratory study in the field of social sciences]. *REDU: Revista de Docencia Universitaria*, 10, 273–289. <https://doi.org/10.4995/redu.2012.6108>
- Fernández-Márquez, E., Leiva-Olivencia, J. J., & López-Meneses, E. (2018). Competencias digitales en docentes de educación superior [Digital competencies in higher education teachers]. *Revista Digital de Investigación en Docencia Universitaria*, 12, 213–231. <https://doi.org/10.19083/ridu.2018.746>

- Hidalgo Durán, G. (2019). Desarrollo de competencias tecnológicas: Reto fundamental para los profesores universitarios Costarricenses [Technological competences development: Fundamental challenge for Costa Rican university teachers]. *Revista Electrónica Calidad en la Educación Superior*, 10(2), 34–52.
<https://doi.org/10.22458/caes.v10i2.1924>
- Ilomäki, L., Paavola, S., Lakkala, M., & Kantosalo, A. (2016). Digital competence: An emergent boundary concept for policy and educational research. *Education and Information Technologies*, 21, 655–679. <https://doi.org/10.1007/s10639-014-9346-4>
- Islim, O. F., & Cagiltay, K. (2016). The impact of OER on instructional effectiveness: A case study. *Eurasia Journal of Mathematics, Science and Technology Education*, 12(3), 559–567. <https://eric.ed.gov/?id=EJ1089891>
- Karimi, H., & Khawaja, S. (2023). The impact of artificial intelligence on higher education in England. *Creative Education*, 14(12), 2405–2415.
<https://doi.org/10.4236/ce.2023.1412154>
- Kotkova, V. V., & Perminova, L. A. (2019). Study of Kherson State University students and teachers' attitudes to the use of ICT. *Information Technologies and Learning Tools*, 72(4), 194–203. <https://doi.org/10.33407/itlt.v72i4.2493>
- Mercader, C. (2019). Las resistencias del profesorado universitario a la utilización de las tecnologías digitales [Resistance by university teachers to using digital technologies]. *Aula Abierta*, 48, 167–174.
<https://doi.org/10.17811/rifie.48.2.2019.167-174>
- Mercader, C., & Sallan, J. G. (2017). How do university teachers use digital technologies in class? *Revista Docencia Universitaria*, 15, 257–273.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2010). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *International Journal of Surgery*, 8(5), 336–341.
<https://doi.org/10.1016/j.ijsu.2010.02.007>
- Muñoz Carril, P. C., Gonzalez Sanmamed, M., & Fuentes Abeledo, E. J. (2011). Technological skills of university teachers: Analysis of their training in computer office tools. *Educación XX1*, 14, 157–188.
<https://www.researchgate.net/publication/286036066>
- Muñoz-Repiso, A. G., & Tejedor, F. J. T. (2010). Evaluación de procesos de innovación escolar basados en el uso de las TIC desarrollados en la Comunidad de Castilla y León [Evaluation of school innovation processes based on ICT development in the Comunidad de Castilla y León]. *Revista de Educación*, 352, 125–147.
- Pérez, J. J. R., Zea, M. P. C., & Ocampo, E. D. (2018). Las competencias digitales: Una necesidad del docente Ecuatoriano del siglo XXI [Digital competences: A need for the Ecuadorian teacher of the XXI century]. *Dilemas Contemporáneos: Educación, Política y Valores*, 6.
<https://dilemascontemporaneoseduacionpoliticaayvalores.com/index.php/dilemas/article/view/570>
- Pérez-Díaz, R. (2019). Teaching digital competence in the teacher training institutes: Case of the Dominican Republic. *Pixel-Bit: Revista de Medios y Educación*, 55, 75–97.
<https://doi.org/10.12795/pixelbit.2019.i55.04>
- Prendes Espinosa, M. P., & Gutierrez Porlan, I. (2013). Spanish university teachers' technological competencies. *Revista de Educación*, 196–222.
- Riascos-Erazo, S. C., Quintero-Calvache, D. M., & Ávila-Fajardo, G. P. (2009). Las TIC en el aula: Percepciones de los profesores universitarios [Information technology in the classroom: The views of university professors]. *Educación y Educadores*, 12(3), 133–157.
<https://educacionyeducadores.unisabana.edu.co/index.php/eye/article/view/1536>

- Ríos Ariza, J. M., Gómez Barajas, E. R., & Rojas Polanco, M. P. (2018). Valoración de competencias TIC del profesorado universitario: Un caso en Chile [Assessment of ICT competencies of university teachers: A case in Chile]. *Pixel-Bit. Revista de Medios y Educación*, (52), 55–65. <https://doi.org/10.12795/pixelbit.2018.i52.04>
- Rodríguez Espinosa, H., Restrepo Betancur, L. F., & Aranzazu, D. (2014). Digital literacy and learning management systems (LMS) in university teaching. *Revista de la Educación Superior*, 43, 139–159. https://www.scielo.org.mx/scielo.php?script=sci_abstract&pid=S0185-27602014000300007&lng=en
- Romero Alonso, R., Plaza, I. R., & Orfali, C. H. (2019). Barriers in teacher perception about the use of technology for evaluation in higher education. *Digital Education Review*, 35, 170–185. <https://doi.org/10.1344/der.2019.35.170-185>
- Ruiz, A. B. M. (2016). El profesorado universitario y las TIC: Análisis de su competencia digital [University teaching staff and ICTs: Analysis of digital competence]. *Ensayos: Revista de la Facultad de Educación de Albacete*, 31(1), 133–147. <https://dialnet.unirioja.es/servlet/articulo?codigo=6535200>
- Starkey, L. (2020). A review of research exploring teacher preparation for the digital age. *Cambridge Journal of Education*, 50(1), 37–56. <https://doi.org/10.1080/0305764X.2019.1625867>
- Suleimen, N. (2019). Appraising the attitude towards information communication technology integration and usage in Kazakhstani higher education curriculum. *Journal of Information Technology Education: Research*, 18, 355–378. <https://doi.org/10.28945/4403>
- Tejada Fernández, J., & Pozos Pérez, K. V. (2018). New scenarios and trainers' digital competencies: Towards the professionalization of teaching with ICT. *Profesorado: Revista de Curriculum y Formación de Profesorado*, 22, 25–51. <https://ddd.uab.cat/record/187930>
- Wang, Z., & Chu, Z. (2023). Examination of higher education teachers' self-perception of digital competence, self-efficacy, and facilitating conditions: An empirical study in the context of China. *Sustainability*, 15, Article 10945. <https://doi.org/10.3390/su151410945>
- Yang, L., Martínez-Abad, F., & García-Holgado, A. (2022). Exploring factors influencing pre-service and in-service teachers' perception of digital competencies in the Chinese region of Anhui. *Education and Information Technologies*, 27, 12469–12494. <https://doi.org/10.1007/s10639-022-11085-6>
- Zhao, Y., Llorente, A. M. P., & Gómez, M. C. S. (2021). Digital competence in higher education research: A systematic literature review. *Computers & Education*, 168, Article 104212. <https://doi.org/10.1016/j.compedu.2021.104212>