

Digital competencies and teaching performance: a correlational study in the university context

Competencias digitales y desempeño docente: un estudio correlacional en el contexto universitario

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Carlos Vidal Montenegro Segovia

<https://orcid.org/0000-0002-9855-8488>

carlos9268@hotmail.com

GH Consulting EIRL. Jaén, Peru

Jhonny Biler Benavides Galvez

<https://orcid.org/0000-0001-8965-282X>

jbbenavidesg@unach.edu.pe

Universidad Nacional Autónoma de Chota. Chota, Peru

Irma Elizabeth Arévalo Cotrina

<https://orcid.org/0009-0004-8497-8790>

arevalocotrinairema@gmail.com

Instituto de Educación Superior Pedagógico Público "Bambamarca". Bambamarca, Peru

Grimaldo Heredia Pérez

<https://orcid.org/0000-0001-5235-2786>

g.heredia@uct.edu.pe

Universidad Católica de Trujillo Benedicto XVI. Trujillo, Peru

Ever Allcca Perez

<https://orcid.org/0009-0007-5422-1932>

eversonallcca@gmail.com

Universidad Nacional José María Arguedas. Andahuaylas, Peru

Edison Yoel Heredia Pérez

<https://orcid.org/0000-0003-3579-5846>

edisonheredia@pedagogicoomc.edu.pe

Instituto de Educación Superior Pedagógico Público "Octavio Matta Contreras". Cutervo, Peru

Abstract

This article examines the relationship between digital competencies (DC) and teaching performance (TP) in a university setting, with the aim of understanding how teachers' level of technological skills is linked to the quality of their academic work. It explores how digital capabilities influence key aspects of professional practice, such as mastery of the discipline, teaching skills, classroom management, and teacher self-efficacy. The research adopts a quantitative approach, with a non-experimental and correlational design, which allows relationships between variables to be identified without directly manipulating them. The sample consists of 420 graduate university teachers, selected intentionally, who were given a structured questionnaire as the main data collection tool. The results reveal a positive and significant correlation between digital competencies and teaching competencies, indicating that greater mastery of technological tools is associated with better teaching practices. In this sense, strengthening digital competencies not only promotes the efficient use of virtual environments, but also contributes to more dynamic, innovative, and relevant teaching in educational contexts that are increasingly mediated by technology.

Keywords: digital competence, teaching, higher education

Resumen

Este artículo examina la relación entre las competencias digitales (CD) y el desempeño docente (DD) en un entorno universitario, con el propósito de comprender cómo el nivel de habilidades tecnológicas de los docentes se vincula con la calidad de su labor académica. Se explora cómo las capacidades digitales influyen en aspectos

clave del ejercicio profesional, como el dominio de la disciplina, dominio didáctico, gestión de la clase y la autoeficacia docente. La investigación adopta un enfoque cuantitativo, con un diseño no experimental y de nivel correlacional, lo cual permite identificar relaciones entre las variables sin manipularlas directamente. La muestra está conformada por 420 docentes universitarios de posgrado, seleccionados de manera intencional, a quienes se les aplicó un cuestionario estructurado como instrumento principal de recolección de datos. Los resultados obtenidos revelan una correlación positiva y significativa entre las CD y el DD, lo que indica que un mayor dominio de herramientas tecnológicas se asocia con mejores prácticas pedagógicas. En este sentido, el fortalecimiento de las competencias digitales no solo favorece el uso eficiente de los entornos virtuales, sino que también contribuye a una docencia más dinámica, innovadora y pertinente en contextos educativos cada vez más mediados por la tecnología.

Palabras clave: competencia digital, docencia, enseñanza superior

Introduction

In modern education, studying digital competencies and their relationship with teacher performance is crucial in the context of higher education. Globally, the rapid growth of information technologies has transformed not only the way knowledge is accessed but also the methods of teaching and learning. In Spain, policies have been implemented to enhance the digital training of university professors. It is recognized that knowing how to use these tools is essential for more effective, inclusive teaching that meets the new demands of students (De la Cruz et al., 2023). In Latin America, particularly in Ecuador, significant challenges remain in integrating digital tools into teaching. This became more evident during the pandemic, when many educators struggled to conduct virtual classes effectively. Although institutions have made efforts to promote technological updates, further research is crucial to understand how these improvements manifest in both in-person and virtual classrooms. Therefore, it is essential to thoroughly analyze this relationship, as an education enhanced by technology not only addresses current challenges but also prepares for future transformations in education (Orozco et al., 2023).

Peru also faces a significant challenge in education: strengthening the digital competencies of university educators, as this is a crucial factor for improving their practice. In recent years, universities have shown increased interest in enhancing the technological training of their educators due to the rapid changes brought about by the virtualization of learning. However, various studies have indicated that there are still significant differences in how technologies are effectively utilized in teaching, which impacts the quality of university education (Tapia & Osorio, 2023). While most educators have access to digital platforms, they do not always possess the necessary skills to use them efficiently and reflectively in their teaching. It is important to study how digital skills relate to teacher performance, as improving these competencies could lead to more innovative, participatory, and student-centered teaching methods. It is crucial that universities not only provide technological tools to their professors but also support them in their ongoing professional development (Casimiro et al., 2022).

Regarding previous studies on the connection between digital skills and teacher performance, international research by Kanobel et al. (2023) in Argentina stands out. This study aimed to analyze how digital skills affect the teaching of university professors. The authors found that educators with greater mastery of digital competencies not only utilized virtual platforms more effectively but also interacted more meaningfully with their students and could adjust their teaching methods in hybrid environments. In the context of Peru, Dávila et al. (2022) note that educators with more digital training exhibited a more active attitude, greater energy in their teaching methods, and better control of the virtual environment. Their study concluded that it is urgent to strengthen these competencies to improve the quality of higher education in the country.

Digital competencies (DC) are the knowledge, attitudes, and skills that enable individuals to use digital technologies to learn, work, and participate in society in a secure, creative, and critical manner (Comisión Europea, 2022). This means that it is not enough to simply know how to use a computer; it is also important to understand how to use these tools to solve problems and create valuable content. For Saltos (2022), it is about the comprehensive ability of the educator to integrate technologies into their pedagogical practice, from searching and managing information to creating more interactive and personalized learning environments. Theoretically, DC is well-supported by the digital competence model suggested by Siemens' Connectivism theory. This approach posits that learning occurs not only through the accumulation of knowledge but also through the ability to create and maintain networks of information, people, and technological resources. Connectivism emphasizes that in a connected world, digital skills help educators not only access vast amounts of information but also filter, select, and use what is most appropriate for their classes (Mulumeoderhwa, 2024).

Regarding teacher performance (TP), according to Chávez et al. (2022), it encompasses the set of functions, strategies, and qualities that a teacher employs to facilitate student learning. This ensures that content

is understood and applied; it is not merely about delivering classes but also about motivating and effectively supporting the educational process. Additionally, Monier (2023) states that TP is the ability to plan, execute, and evaluate education, adapting to the characteristics and demands of learners. This includes designing materials and activities, managing time, ensuring clear communication, and conducting fair and formative assessments. Finally, Ccoto (2023) notes that good teaching practice combines solid subject knowledge with pedagogical and interpersonal skills, creating an environment of camaraderie and respect that fosters learning. In this context, TP is supported by Bandura's social learning theory, which, as explained by Hernández et al. (2024), holds that much of learning occurs through observation and interaction with others. This means that students learn not only from what the teacher directly states but also from their example, attitude, and how they face challenges in the classroom.

This article provides a clear and necessary perspective on how DC relates to TP in higher education. In an academic world where technology plays a significant role, understanding this connection helps to recognize the strengths and weaknesses of educators. The study aimed to identify the association between DC and TP at a private university in the province of Trujillo, Peru.

Methodology

This study is basic, as it seeks to understand how and why digital competencies (DC) may affect the work of educators in higher education. It is not aimed at promoting immediate change but at generating knowledge that will serve as a foundation for future research. A quantitative approach is utilized, which involves working with numerical data and precise measurements to study the variables.

Regarding the design, this study is non-experimental and cross-sectional, as the variables (DC and TP) are observed as they exist in reality, without manipulation or intervention. Information is collected at a single point in time. Additionally, the level is correlational, as it not only describes the characteristics of each variable separately but also analyzes whether there is a relationship between them, the direction of that relationship, and its intensity.

For this study, a sample of 420 graduate educators from a private university in the province of Trujillo, Peru, was utilized. Participants were selected intentionally rather than randomly, meaning they were chosen based on ease of contact and willingness to collaborate in the research. Clear inclusion criteria were defined: only those teaching in-person or virtual modalities during the study period and who consented to participate voluntarily were considered. Those without a formal link to the institution or unavailable when the questionnaire was administered were excluded.

Information for this study was obtained through surveys, allowing for the direct collection of opinions and experiences from participating educators. Two different questionnaires were used: one to measure DC and another to evaluate TP. The first contained 25 items, while the second had 20. Both questionnaires were applied uniformly to all participants, ensuring the comparability of responses. Furthermore, they were validated by experts in education and technology. The Cronbach's alpha coefficient was calculated to establish internal consistency, demonstrating that the items in each questionnaire exhibited high reliability and coherence.

After collecting the information, the data were processed using SPSS statistical software (Version 27). Descriptive and inferential statistical methods were applied to analyze the behavior of the variables and present results in clear tables. Non-parametric tests (Spearman's Rho) were employed to determine the magnitude and direction of the association between the analyzed variables.

Regarding the ethical aspects of the study, it was ensured that each phase of the process adhered to the essential principles of responsible research. The privacy of the data provided by educators was preserved, safeguarding their identity and ensuring that the data were used exclusively for academic purposes. Participation was entirely voluntary, facilitated by informed consent that explicitly specified the purpose of the study and the use of the data.

Results

Table 1

Results for the variable digital competencies and its dimensions

| | Low | | Medium | | High | |
|------------------------------------------|-----|-------|--------|-------|------|-------|
| | f | % | f | % | f | % |
| D1. Information and Information Literacy | 158 | 37.6% | 147 | 35.0% | 115 | 27.4% |
| D2. Communication and Collaboration | 136 | 32.4% | 185 | 44.0% | 99 | 23.6% |
| D3. Creation of Digital Content | 134 | 31.9% | 179 | 42.6% | 107 | 25.5% |

| | | | | | | |
|--------------------------|-----|-------|-----|-------|-----|-------|
| D4. Security | 128 | 30.5% | 187 | 44.5% | 105 | 25.0% |
| D5. Problem Solving | 141 | 33.5% | 167 | 39.8% | 112 | 26.7% |
| V1. Digital Competencies | 107 | 25.5% | 221 | 52.6% | 92 | 21.9% |

In Table 1, it can be observed that in the dimension of *information and information literacy*, 37.6% of the educators exhibit a low level, 35.0% classify it as medium, and 27.4% rate it as high. In the context of *communication and collaboration*, 32.4% are categorized as low, 44.0% as medium, and 23.6% as high. Regarding the creation of digital content, 31.9% demonstrate a low level, 42.6% a medium level, and 25.5% a high level. In the dimension of *security*, 30.5% are at a low level, 44.5% at an intermediate level, and 25.0% at a high level. For *problem-solving*, 33.5% reach a low level, 39.8% a medium level, and 26.7% a high level.

Lastly, regarding *digital competencies*, 25.5% are classified at a low level, 52.6% at a medium level, and 21.9% at a high level. This suggests that a significant portion of educators possess medium levels of digital competencies, another segment achieves advanced levels, and a small percentage indicates a need to strengthen these competencies

Table 2
Results for the variable teacher performance and its dimensions

| | Low | | Medium | | High | |
|------------------------------------------|-----|-------|--------|-------|------|-------|
| | f | % | f | % | f | % |
| D1. Mastery of the Discipline | 91 | 21.7% | 273 | 65.0% | 56 | 13.3% |
| D2. Didactic Mastery | 89 | 21.2% | 267 | 63.6% | 64 | 15.2% |
| D3. Classroom Management | 86 | 20.5% | 261 | 62.1% | 73 | 17.4% |
| D4. Motivation and Teacher Self-efficacy | 102 | 24.3% | 263 | 62.6% | 55 | 13.1% |
| V2. Teacher Performance | 78 | 18.6% | 266 | 63.3% | 76 | 18.1% |

In Table 2, it is evident that in the dimension of *mastery of the discipline*, 21.7% of educators are classified at a low level, 65.0% at a medium level, and 13.3% at a high level. In the dimension of *didactic mastery*, 21.2% exhibit a low level, 63.6% a moderate level, and 15.2% a high level. In terms of classroom management, 20.5% rate it as low, 62.1% as medium, and 17.4% as high. In the dimension of *motivation and teacher self-efficacy*, 24.3% are at a low level, 62.6% at a medium level, and 13.1% at a high level. Ultimately, for *teacher performance*, 18.6% are classified at a low level, 63.3% at a medium level, and 18.1% at a high level. This indicates that a large portion of educators demonstrate intermediate performance, a small percentage achieve high levels, and a significant group shows a need for improvement

Table 3
Normality test

| | Kolmogorov-Smirnov | | |
|----------------------|--------------------|-----|-------|
| | Statistic | df | Sig. |
| Digital competencies | 0.070 | 420 | 0.000 |
| Teacher performance | 0.051 | 420 | 0.011 |

The results indicate a significance level below 0.05, confirming that there is no normal distribution of the processed data. Thus, for hypothesis testing, the Spearman correlation coefficient was employed.

Table 4
Correlation between digital competencies and teacher performance

| Digital competencies | Teacher performance | |
|----------------------|----------------------|---------|
| | Spearman correlation | p-value |
| | 0.815 | 0.000 |
| | | N |
| | | 420 |

Table 4 demonstrates a high and significant positive correlation between DC and TP, with a statistically obtained Spearman value of 0.815 and a p-value of 0.000.

Table 5*Correlation between information and information literacy and teacher performance*

| | Teacher performance | |
|---------------------------------------------|----------------------------|-------|
| Information and information literacy | Spearman correlation | 0.754 |
| | p-value | 0.000 |
| | N | 420 |

Table 5 shows a strong and significant positive relationship between information and information literacy and TP, with a Spearman coefficient of 0.754 and a p-value of 0.000.

Table 6*Correlation between communication and collaboration and teacher performance*

| | Teacher performance | |
|----------------------------------------|----------------------------|-------|
| Communication and collaboration | Spearman correlation | 0.728 |
| | p-value | 0.000 |
| | N | 420 |

Table 6 indicates a strong and significant positive relationship between communication and collaboration and TP, with a Spearman coefficient of 0.728 and a p-value of 0.000.

Table 7*Correlation between creation of digital content and teacher performance*

| | Teacher performance | |
|------------------------------------|----------------------------|-------|
| Creation of digital content | Spearman correlation | 0.736 |
| | p-value | 0.000 |
| | N | 420 |

Table 7 reveals a strong and significant positive relationship between the creation of digital content and TP, with a Spearman coefficient of 0.736 and a p-value of 0.000.

Table 8*Correlation between security and teacher performance*

| | Teacher performance | |
|-----------------------|----------------------------|-------|
| S Security | Spearman correlation | 0.710 |
| | p-value | 0.000 |
| | N | 420 |

Table 8 indicates a strong and statistically significant relationship between security and TP, with a Spearman coefficient of 0.710 and a p-value of 0.000.

Table 9*Correlation between problem solving and teacher performance*

| | Teacher performance | |
|------------------------|----------------------------|-------|
| Problem solving | Spearman correlation | 0.732 |
| | p-value | 0.000 |
| | N | 420 |

Table 9 shows that the relationship between problem-solving and TP is strong and significant, with a Spearman coefficient of 0.732 and a p-value of 0.000.

Discussion

Regarding the overall objective, it is established that there is a positive and significant relationship between digital competencies and teacher performance at a private university in the province of Trujillo, Peru, as a statistically significant Spearman's Rho value of 0.815 and a p-value of 0.000 were obtained. Furthermore, it was found that the majority of educators perceive their digital competencies as being at a medium level (52.6%), while teacher performance is also predominantly perceived at a medium level (63.3%).

The findings align with the results of Dávila et al. (2022), who assert that educators' digital competencies are a key element in improving pedagogical practice, as they enable faculty to plan, develop, and evaluate teaching-learning processes with the support of technological resources tailored to students' needs; this finding is statistically supported ($r = 0.784$; $p = 0.000$). They also concluded that adding digital skills not only benefits academic management but also enhances students' innovative capacities and interests. Additionally, the findings are consistent with those of Gaona et al. (2024), who demonstrated that greater mastery of skills such as creating digital products and communicating in virtual environments is related to superior teacher performance, especially in higher education. These authors emphasize that, in hybrid or fully virtual contexts, effective management of digital tools is not only an added value but also an essential requirement for ensuring the quality of education.

Moreover, the findings resonate with the conclusions of Torres et al. (2022), who determined that aspects of information and information literacy significantly impact teaching effectiveness. Their study confirmed that teachers with greater skills in researching, filtering, and utilizing reliable information, as well as resolving technical issues, achieve more efficient interactions with students and a more organized management of their classes. Lastly, there is agreement with Tapia and Osorio (2023), who assert that digital security is a fundamental mechanism in the competency profile of educators, influencing teachers' confidence in using technologies and safeguarding sensitive data, which in turn leads to a more secure and professional performance. According to these authors, continuous training in this area strengthens self-efficacy and reduces barriers to technology adoption.

Theoretically, the results are supported by the digital competency model suggested by Siemens' Connectivism theory. This approach posits that learning occurs not only through the accumulation of knowledge but also through the ability to create and maintain networks of information, people, and technological resources. Connectivism holds that, in a connected world, digital skills help teachers not only access vast amounts of information but also filter, select, and utilize the information most appropriate for their classes (Mulumeoderhwa, 2024).

Additionally, the results are underpinned by Bandura's social learning theory, which, as explained by Hernández et al. (2024), states that much learning occurs through observation, imitation, and interaction with others. This means that students learn not only from what the teacher directly states but also from their example, attitude, and how they tackle challenges in the classroom.

According to Huachos et al. (2022), educators' digital competencies require a comprehensive and continuous training approach that proactively and preventively addresses the needs of contemporary education. Its primary objective is to ensure that teachers can anticipate technological and educational changes, adjusting their methods before difficulties in using ICT impact the quality of learning. The idea is to address gaps in digital skills early, which helps avoid issues in planning, management, and evaluation of education. In this way, the achievement of academic and institutional objectives can be ensured effectively.

Conclusions

It was determined that there is a positive and significant relationship between digital competencies and teacher performance at a private university in the province of Trujillo, as a Spearman correlation of 0.815 and a p-value of 0.000 were obtained through statistical analysis. This suggests that as educators enhance their digital skills, they also tend to improve their pedagogical performance.

A positive and significant relationship was established between information and information literacy and teacher performance at a private university in the province of Trujillo, with a Spearman coefficient of 0.754 and a p-value of 0.000. This value indicates that as educators improve their ability to search for, evaluate, select, and critically use information in digital environments, their professional performance also significantly increases.

A positive and significant relationship was identified between communication and collaboration and teacher performance, with a Spearman coefficient of 0.728 and a p-value of 0.000. This result shows that when educators enhance their skills in communication, information sharing, activity coordination, and collaborative work in digital environments, their professional performance consistently improves.

A positive and significant relationship was confirmed between the creation of digital content and teacher performance, with a Spearman coefficient of 0.736 and a p-value of 0.000. This result indicates that as educators

learn to create, produce, modify, and adapt digital resources, their professional performance generally improves markedly.

A positive and significant relationship was demonstrated between security and teacher performance, with a Spearman coefficient of 0.710 and a p-value of 0.000. This result highlights that a higher level of digital competencies related to security and the safe use of platforms and technological resources corresponds with a higher level of professional performance among educators.

Lastly, a positive and significant relationship was corroborated between problem-solving and teacher performance, with a Spearman coefficient of 0.732 and a p-value of 0.000. This finding shows that educators who are more capable of detecting, analyzing, and effectively responding to complex situations tend to achieve superior academic performance.

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