Digital Competences in Teacher Training: Challenges and Opportunities from the Students' Perspective

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Abstract. This qualitative study explores the perceptions and experiences of pedagogy students and future teachers regarding digital competencies. Through an online questionnaire with open-ended questions, we investigated how these students from the Faculty of Education of Bologna perceive the importance of digital competencies, their training experiences, and the strategies they consider most effective for their development. The findings reveal a widespread recognition of the importance of digital competencies, but also highlight challenges in their integration into teacher training and practice. Students emphasize the need for a balanced approach that combines technology with traditional methods and stress the importance of practical training and critical reflection. The study provides valuable insights for designing effective teacher training programs that foster the development of solid and contextualized digital competencies, empowering future educators to navigate the complexities of the digital age.

Keywords: digital competencies, teacher training, qualitative research, student perceptions

1. Introduction

Numerous studies have highlighted that digital competencies are essential for enhancing the quality of education and ensuring that students and educators are equipped to navigate the increasingly digital learning environments. Recent research emphasizes the importance of integrating digital tools and fostering technological literacy among both teachers and students to improve educational outcomes. For instance, Martínez-Serrano (2019) found that while primary education teachers perceive themselves as well-trained in the use of Information and Communication Technologies (ICT), there remains a significant gap between this training and the actual implementation of these tools in classroom practice. This underscores the ongoing challenges in effectively incorporating digital competencies into everyday educational settings.

Furthermore, Domingo-Coscolla et al. (2020) emphasize the necessity of linking university training with societal needs, particularly in developing teachers' digital competencies. They argue that fostering an environment where digital competencies are actively used to enhance collaborative learning and digital authorship is crucial for the professional development of future educators. Moreover, the study highlights the importance of communication and collaboration in the teaching and learning process, facilitated by effective digital resources. This approach not only enhances the digital competence of educators but also prepares them to integrate these tools meaningfully into their teaching practices.

Recent research continues to emphasize the importance of these attitudes. Hatlevik et al. (2018) found that teachers' self-perception of digital competence significantly influences their integration of digital tools in teaching. Similarly, Janssen et al. (2019) highlight that educators' attitudes towards technology play a critical role in the success of digital competency development. These findings underscore the need for teacher training programs to address both the technical and attitudinal aspects of digital competence.

Bentri and Hidayati (2023) emphasize that training in digital competencies must go beyond mere technical instruction, highlighting the importance of reshaping teachers' pedagogical practices. For these competencies to be meaningfully integrated into education, teachers must perceive them as valuable resources that can enrich their practice rather than simply viewing them as additional skills. The training of digital competencies has been the subject of extensive study, with researchers seeking to identify the best practices for preparing future educators. Mishra and Koehler's (2006) TPACK model (Technological Pedagogical Content Knowledge) proposes that teacher training should integrate technological, pedagogical, and content knowledge, enabling educators to design and execute effective learning experienc-

es in digital environments. Similarly, the European frameworks DIGCOMP and DIGCOMPEDU (Carretero et al., 2017; Ghomi and Redecker, 2018) provide structured guidelines for the development of digital competencias. DIGCOMP outlines five key areas, including digital content creation, communication and collaboration, and problem-solving, offering a comprehensive roadmap for digital literacy in diverse contexts. On the other hand, DIGCOMEDU is tailored specifically for educators and emphasizes six areas, such as empowering learners and facilitating their digital competence. Both frameworks highlight the need for integrating technology into teaching practices in a coherent and contextualized manner, reinforcing the notion that digital competencies should not be taught in isolation but as part of a comprehensive approach aligned with pedagogical and content goals.

Recent studies have reinforced the need for a holistic approach to digital competency training. Redecker and Punie (2019) argue that a comprehensive digital competence framework is essential for ensuring that educators can effectively integrate digital technologies into their teaching practices. Moreover, Valtonen et al. (2020) emphasize that developing digital competencies in teacher education is crucial to meet the demands of 21st-century education.

Tondeur et al. (2016) highlight the importance of practical training in the development of digital competencies. Their study on the integration of technologies in teacher training revealed that programs incorporating practical experiences and the direct use of technologies in real teaching contexts are more effective in developing robust digital competencies in future educators. These findings emphasize that theoretical knowledge of digital tools is not enough; it is crucial for teacher trainees to have opportunities to apply this knowledge in practical situations, thereby strengthening their competence and confidence in using technologies in their future work. In light of recent global challenges, the emphasis on practical, context-based training has become even more pertinent (Zhao & Watterston, 2021).

Anthonysamy et al. (2020) contribute to this field of knowledge by emphasizing the importance of self-regulated learning in the development of digital competencies. Their research shows that students and teachers who actively engage in exploring and managing their own learning in digital environments independently develop greater digital competence and are better prepared to face technological challenges in their careers. This self-regulated learning approach reinforces the idea that, although formal training is crucial, continuous and self-directed competency development is equally important in a world where technologies evolve rapidly.

From a theoretical perspective, the integration of technologies in teaching and learning has been addressed from various angles. Sweller's (1988) cognitive load theory suggests that the use of digital tools must be careful-

ly designed to avoid overloading students' cognitive capacity. This implies that training in digital competencies should include not only the teaching of technological tools but also pedagogical design that maximizes their effectiveness, ensuring that technology does not become a distraction or an additional burden for students. Vygotsky's (1978) constructivist theory, applied to the digital context, posits that technologies can act as mediating tools that expand the possibilities for collaborative and personalized learning. This perspective reinforces the idea that digital competencies are not limited to the ability to use technology but also encompass the skill to create enriched and meaningful learning environments that foster the active construction of knowledge.

In summary, the existing literature underscores that digital competencies are essential in modern education, but their effective integration depends on both the positive perception of educators and training that combines theory, practice, and critical reflection. For digital competencies to fulfill their potential in the classroom, teacher training programs must adopt a holistic approach that considers the pedagogical, technological, and content needs of future educators. This approach will not only equip teachers with the necessary technical skills but also prepare them to face and leverage the opportunities offered by an increasingly digitized educational environment.

In this context, the present qualitative study aims to deepen the understanding of the perception and training of digital competencies from the perspective of pedagogy students and future teachers at the University of Bologna. The study does not begin with a fixed hypothesis but adopts an exploratory approach to uncover how students perceive the importance of digital competencies, their training experiences, and the strategies they consider most effective for their development. Through an online questionnaire with open-ended questions, the study explores students' opinions on the importance of digital competencies, their training experiences in this area, and the strategies they consider most effective for their development. The study seeks to answer the following research questions:

- How do pedagogy students and future teachers perceive the importance of digital competencies in education?
- What training experiences in digital competencies have students had during their initial training?
- What strategies do students consider most effective for the development of digital competencies in teacher training?

The results of this study will contribute to a better understanding of the needs and expectations of future teachers regarding digital competencies, facilitating the design of more effective teacher training programs and promoting a more reflective and critical use of technology in the classroom.

2. Materials and Methods

Qualitative Approach

The choice of a qualitative approach for this research is based on the need to understand the experiences, perceptions, and contexts of the participants in relation to digital competencies. According to Patera (2022), qualitative research in education offers a unique participatory opportunity for those involved, fostering joint review and collective learning. This process not only enriches the experience of the participants but also democratizes and makes knowledge, decision, and action processes more inclusive. In line with these principles, Winkle-Wagner et al. (2019) emphasize that critical qualitative research not only challenges established paradigms but also creates pathways for social change by integrating critical social theories into the analysis process. This approach bridges the gap between data analysis and critical theory, allowing for a deeper understanding of social inequalities and the development of more equitable educational practices. Additionally, Sutton and Austin (2015) emphasize the role of the researcher in qualitative research: to access the thoughts and feelings of participants while safeguarding their well-being and the integrity of the data collected. This ethical commitment underscores the importance of clear protection mechanisms approved by a research ethics committee, ensuring a process that respects and values the contributions of each participant. The adoption of this qualitative approach, inspired and justified by the contributions of the authors cited above, reflects our commitment to research that is rigorous, ethical, and transformative. Through this approach, we seek not only to understand digital competencies in the educational field but also to contribute to their development and improvement, aligning ourselves with a research paradigm that values depth, participation, and social impact.

Participants

The sample for this study consisted of 31 students from the Primary Education, Early Childhood Education, and Pedagogy degrees at the Faculty of Education Giovanni Maria Bertin, University of Bologna. The selection of participants was voluntary, through an open invitation to participate in the research. The aim was to ensure diversity of profiles and experiences within the sample, including students from different years of study and with varying levels of exposure to digital competency training.

Data Collection Instrument

For data collection, a questionnaire with open-ended questions was used, specifically designed to capture students' perceptions, attitudes, and expe-

riences regarding digital competencies. The questionnaire consisted of 7 open-ended questions that addressed key topics such as:

- The perceived importance of digital competencies in education
- Students' prior training experiences in this area
- The strategies they consider most effective for developing digital competencies
- The challenges and opportunities perceived in integrating technology into teaching practice

Procedure

Data collection was conducted in the second semester of the 2023 academic year, using the Google Forms platform to administer the questionnaire. Students were contacted through institutional email addresses provided by the University of Bologna, inviting them to participate in the study. They were assured that their participation was voluntary and that they could withdraw at any time without consequences. The questionnaire was available for two months, allowing students to complete it at their convenience.

Data Preparation

The qualitative data analysis process began with the preparation of the collected data, a fundamental step that lays the foundation for rigorous inductive analysis. This approach, which starts from empirical data towards the development of explanatory concepts or theories, requires special attention in the initial discovery stage to properly classify and describe the data (Thomas, 2006; Saldaña, 2021).

Organization

The initial readings of the transcripts were crucial to identify the different contents and their location within the text, a process that varies depending on the analyst. Some researchers prefer to write notes in the margins, while others use codes to mark specific themes or informants, and there are those who opt for underlining with colors to differentiate the data (Braun & Clarke, 2013). For the preparation and analysis of the qualitative data collected in this study, the MAXQDA software was used. This program is widely recognized for its ability to facilitate the organization, coding, and analysis of large volumes of textual data, offering an intuitive and robust environment for qualitative research (Kuckartz, 2014; Evers, 2016). Initially, all responses were imported into MAXQDA, which allowed for an initial organization of the data, utilizing its functions to mark texts and assign descriptive labels to specific segments. This initial organization was fundamental in establishing a clear and accessible structure that facilitated the subsequent stages of analysis.

Coding and Data Reduction

The first step of the study was to carefully examine the participants' responses to discover patterns. This was done by reading each response attentively, which allowed the main ideas to be easily identified. This method ensured that the categories and codes created reflected what the data showed, without biases or preconceived notions. As important themes were identified, descriptive codes were assigned to these key ideas, facilitating their organization. To maintain the quality and consistency of this code system, the assigned codes were repeatedly reviewed. This review helped refine and group similar codes, which simplified the data and allowed for a better understanding of the results. At the end of the process, a framework was developed that reflected digital competencies according to the participants' vision. This framework not only highlighted the digital skills that participants considered essential but also pointed out the challenges and opportunities for future development.

Development of the Code System

After the initial identification of patterns and the assignment of descriptive codes, the task of developing and refining the code system in a more structured way was addressed. In the preliminary stages, each question in the questionnaire gave rise to a wide range of codes. This initial approach, although exhaustive, generated a considerable number of codes that extensively covered the participants' responses, reflecting the diversity of thoughts and perspectives. However, this initial system presented significant challenges for analysis. The large number of codes resulted in complexity that could hinder the clear interpretation of the data and the identification of central themes. Recognizing this difficulty, an expert in the field was consulted to review and refine our coding system. The expert recommended a more selective and focused strategy: reducing the number of codes initially established. This recommendation was based on the premise that a more simplified code system could essentially capture the same perceptions and trends without compromising the depth or richness of the analysis. Therefore, a careful review and consolidation of the codes was carried out, merging those that were similar or could be grouped under a broader theme. This process not only simplified the analysis but also improved the coherence and manageability of the code system. The reduction of codes, guided by the expert's experience and critical analysis, allowed for a more focused approach. By concentrating on fewer codes, we were able to delve deeper into the analysis of the responses, which facilitated the identification of more significant and relevant patterns. This more refined approach also improved the efficiency of the data analysis process, allowing for a clearer and more direct interpretation of the emerging themes. The development of the code system shifted

from an initially broad approach to a more concentrated and effective one. This not only enhanced the analysis methodology but also underscored the importance of adaptability and expert review in qualitative research. In the end, the adjusted code system offered an optimal balance between comprehensiveness and clarity, facilitating a deeper and more nuanced understanding of digital competencies from the participants' perspective.

Ethical Considerations

Several measures were taken to ensure research ethics. All participants were informed about the purpose of the study and were guaranteed the confidentiality of their responses. Informed consent was obtained from each participant before administering the questionnaire, and the data was anonymized to protect the participants' identities. Furthermore, the study complied with the ethical regulations established by the University of Bologna for research involving human subjects.

3. Results

The analysis of the questionnaire responses revealed several key findings regarding the perception and training of digital competencies in pedagogy students and future teachers. The results are presented below, organized around the main categories and codes identified in the thematic analysis.

3.1. Perception of Digital Competencies

The majority of participants (71%) consider digital competencies to be fundamental or essential in today's education. They highlight their importance for understanding the digital reality, improving the quality of teaching and learning, preparing students for the future, and facilitating the management of school activities. As one participant expressed, *"Penso che siano fondamentali, soprattutto per capire la realtà in cui viviamo e avere consapevolezza anche critica degli strumenti a nostra disposizione"* (*"I think they are fundamental, especially to understand the reality in which we live and to have even critical awareness of the tools at our disposal"*). Some students mention that these competencies are complementary to traditional skills and can improve student motivation and engagement. A representative testimonial of this view is: *"Le competenze digitali sono super importanti per noi studenti! Ormai la tecnologia fa parte di tutto quello che facciamo, sia dentro che fuori dalla scuola. Quindi è fondamentale che noi impariamo a usarla bene"* (*"Digital skills are super important for us students! Now technology is part of everything we do, both inside and outside of school. So it is essential that we learn to use it well"*).

However, concerns also arose regarding the balance between the use of technology and traditional methods, the need for specific teacher training,

and the importance of preserving human interaction in the educational process. Some students pointed out that digital competencies should not replace traditional learning or face-to-face interaction between teachers and students. One of the participants expressed this concern as follows: *"La tecnologia facilita l'accesso all'informazione, ma non sostituisce la saggezza e la passione che un buon professore trasmette in una lezione in presenza"* (*"Technology facilitates access to information, but it does not replace the wisdom and passion that a good teacher transmits in a face-to-face lesson"*).

3.2. Training in Digital Competencies

Most participants (74%) stated that they had received specific training in digital competencies during their university education, mainly through courses, modules, or workshops. This training has allowed them to improve their ability to use various digital tools, create more interactive teaching materials, and contribute to their professional and personal development. One student commented: *"ho sostenuto alcuni esami che mi hanno permesso di utilizzare con maggiori vantaggi alcuni programmi, utili sia a livello personale che a livello professionale (Excel, Canva, Google Sites, per esempio)"* (*"I have taken some exams that have allowed me to use some programs with greater advantages, useful both personally and professionally (Excel, Canva, Google Sites, for example)"*).

However, a small percentage (10%) indicated not having received specific training in digital competencies, suggesting the need to strengthen the integration of these competencies into curricula. One participant noted: *"Nella mia opinione, la dedicazione alla materia all'interno del piano formativo è limitata"* (*"In my opinion, the dedication to the subject within the training plan is limited"*). Some students also mentioned self-learning as a way to develop their digital competencies, highlighting the importance of promoting autonomy and continuous learning in this area. As one student stated: *"Non ancora, ma ho cercato di acquisire queste abilità da autodidatta attraverso la pratica e l'esperienza personale"* (*"Not yet, but I have tried to acquire these skills in a self-taught way through practice and personal experience"*).

3.3. Impact on Teaching and Learning

Students identified various benefits of using digital competencies in the classroom. The most mentioned category was support and personalization of learning (58%), highlighting how digital technologies can facilitate understanding of concepts, adapt to the individual needs of students, and promote inclusion. One participant commented: *"Con le competenze digitali, gli insegnanti possono utilizzare strumenti di analisi dati per identificare le aree in cui gli studenti necessitano di ulteriore supporto e offrire interventi mirati"* (*"With digital skills, teachers can use data analysis tools to identify areas where students need further support and offer targeted interventions"*).

Other prominent categories were feedback, assessment, and communication (19%) and inclusion and participation (23%). Students mentioned the use of digital tools to provide feedback, assess student progress, and improve communication between teachers, students, and parents. An example of this is: *"La tecnologia può migliorare la comunicazione tra insegnanti, studenti e genitori, consentendo un coinvolgimento più attivo e un intercambio di informazioni più efficace"* (*"Technology can improve communication between teachers, students, and parents, allowing for more active involvement and a more effective exchange of information"*). They also pointed out how technology can promote the inclusion and participation of all students, especially those with special educational needs. One student shared: *"Grazie alle competenze digitali l'insegnante possiede conoscenze, competenze e sviluppa strategie utili per un reale coinvolgimento degli alunni: schermo touch, elementi sonori, immagini, video, giochi didattici, classe rovesciata, sono tutti elementi che catturano l'attenzione degli alunni; si potrebbero anche includere con maggior facilità eventuali bambini con difficoltà (DSA, disturbo dell'attenzione, ritardo cognitivo,…), coinvolgendoli nel lavoro in classe e non in un'altra aula della scuola"* (*"Thanks to digital skills, the teacher has knowledge, skills, and develops useful strategies for real student involvement: touch screen, sound elements, images, video, educational games, flipped classroom, are all elements that capture students' attention; it would also be possible to include children with difficulties more easily (DSA, attention deficit disorder, cognitive delay, …), involving them in classroom work and not in another classroom in the school"*).

4. Future Challenges

Students anticipated various challenges in incorporating digital competencies into their future teaching practice. The main concern was the need for balance and the possible dependence on technology (45%), followed by technical and training challenges (39%). Students expressed concern about the risk of excessive technology use, the need for constant updating, and the lack of adequate resources and training. One of the participants commented: *"La necessità di mantenere un equilibrio adeguato tra l'uso della tecnologia e le metodologie di insegnamento tradizionali è una sfida che gli insegnanti potrebbero affrontare nell'incorporazione di competenze digitali"* (*"The need to maintain an adequate balance between the use of technology and traditional teaching methodologies is a challenge that teachers could face in incorporating digital skills"*).

Other challenges mentioned include the digital divide between students, online security and privacy, and the need to maintain student motivation in digital environments. One student highlighted: *"Le sfide potrebbero anche includere la mancanza di accesso equo alla tecnologia e alle risorse digitali, il che potrebbe ampliare la disparità digitale tra gli studenti"* (*"The challenges*

could also include the lack of equitable access to technology and digital resources, which could widen the digital divide between students"). These challenges highlight the importance of comprehensively addressing the integration of digital competencies in education, considering both technical and pedagogical and ethical aspects.

5. Overcoming Difficulties

To overcome the challenges associated with integrating digital competencies, students proposed various strategies. The most mentioned category was innovation in learning (61%), which includes the development of innovative projects, experimentation with new technologies, and collaboration with other educational actors. A representative testimonial of this category is: *"Per superare questi ostacoli, credo che dovremmo concentrarci su progetti di apprendimento innovativi che sfruttino appieno il potenziale delle competenze digitali, ma sempre con un occhio attento alla qualità e all'equità dell'istruzione"* (*"To overcome these obstacles, I believe we should focus on innovative learning projects that fully exploit the potential of digital skills, but always with a watchful eye on the quality and equity of education"*).

Other prominent strategies were the balance between technology and traditional methods (23%) and self-learning and continuous training (19%). Students emphasized the importance of finding a balance between the use of technology and traditional teaching methods, as well as the need to stay updated and continue learning autonomously. One student stated: *"Penso che la chiave per superare queste difficoltà sia l'aggiornamento costante e la formazione continua. Dobbiamo rimanere al passo con le nuove tecnologie e imparare a utilizzarle in modo efficace"* (*"I think the key to overcoming these difficulties is constant updating and continuous training. We have to keep up with new technologies and learn to use them effectively"*).

6. Effective Training Strategies

Students considered practical training and the use of educational technologies to be the most effective strategies for developing digital competencies (52%). They highlighted the importance of practical experience in real or simulated contexts, as well as the need to learn how to use specific digital tools and platforms. One student commented: *"Nel corso di pedagogia come in quello di scienze dell'educazione e della formazione è fondamentale insegnare ad utilizzare quelle tecnologie atte a semplificare la vita dei bambini e dei ragazzi con difficoltà di apprendimento o disturbo dell'attenzione o spettro dell'autismo"* (*"In the Pedagogy course, as in that of Educational and Training Sciences, it is essential to teach how to use those technologies aimed at simplifying the lives of children and young people with learning difficulties or attention deficit disorder or autism spectrum disorder"*).

Critical reflection and autonomous learning, and digital ethics and security were also mentioned as important strategies (52% and 16%, respectively). Students valued the ability to critically reflect on the use of technology and to learn autonomously, as well as the importance of addressing ethical and security issues in the digital environment. An example of this perspective is: *"Credo che una strategia fondamentale nella formazione sulle competenze digitali sia promuovere l'apprendimento autonomo. Questo implica incoraggiare gli studenti a essere critici con il proprio processo di apprendimento, riflettendo su come e perché utilizzano determinati strumenti digitali"* (*"I believe that a fundamental strategy in training on digital skills is to promote autonomous learning. This involves encouraging students to be critical of their own learning process, reflecting on how and why they use certain digital tools"*).

7. Improving Engagement and Motivation

Students identified various ways in which digital competencies can improve student engagement and motivation in the classroom. The most mentioned category was the use of interactive digital tools (42%), such as digital whiteboards, tablets, and educational applications. One student shared their experience: *"Avere uno schermo in classe attraverso il quale l'insegnante mostra immagini di ciò che sta spiegando è molto utile per aiutare i bambini a visualizzare ciò di cui il professore sta parlando, e la visualizzazione è fondamentale nel processo di assimilazione e accomodamento dell'informazione"* (*"Having a screen in the classroom through which the teacher shows images of what they are explaining is very useful to help children visualize what the teacher is talking about, and visualization is fundamental in the process of assimilation and accommodation of information"*).

Gamification and digital projects were also considered important (32%), as was personalized and autonomous learning (29%). Students highlighted how technology can make learning more interactive, personalized, and adapted to individual interests, which in turn increases motivation and engagement. An example of this view is: *"Le competenze digitali possono rendere l'insegnamento più accattivante, ad esempio attraverso l'uso di giochi educativi interattivi che stimolino la partecipazione attiva degli alunni"* (*"Digital skills can make teaching more engaging, for example, through the use of interactive educational games that stimulate the active participation of students"*).

4. Discussion and Conclusions

The results of this qualitative study reveal a largely positive perception of digital competencies among pedagogy students and future teachers. The majority recognize their fundamental importance in current education, highlighting their potential to improve the quality of teaching and learning,

prepare students for the future, and promote inclusion. These findings align with previous literature that underscores the essential role of digital competencies in 21st-century education (Domingo-Coscolla et al., 2020; Redecker & Punie, 2019; Shalgimbekova et al., 2024; Valtonen et al., 2020).

The training in digital competencies received by the students during their university education has been positively evaluated, although a small percentage stated that they had not received specific training, suggesting the need to strengthen the integration of these competencies into the curricula. Additionally, self-learning emerges as an important complementary strategy for the development of digital competencies, in line with the findings of Anthonysamy et al. (2020).

Students identified various benefits of using digital competencies in the classroom, highlighting their ability to support and personalize learning, facilitate assessment and communication, and promote inclusion and participation.

However, students also anticipated challenges in incorporating digital competencies into their future teaching practice, mainly related to the need for balance between technology and traditional methods, as well as technical and training difficulties. These challenges underscore the importance of teacher training that goes beyond mere technical instruction, also addressing the pedagogical and ethical aspects of technology use in the classroom (Bentri & Hidayati, 2023).

To overcome these challenges, students proposed strategies such as innovation in learning, balance between technology and traditional methods, and self-learning and continuous training. Practical training and the use of educational technologies were considered the most effective strategies for developing digital competencies, which coincides with the findings of Tondeur et al. (2016) on the importance of practical experience in teacher training.

In conclusion, this qualitative study offers valuable insights into the perception and training of digital competencies in pedagogy students and future teachers. The results suggest that, while there is widespread recognition of the importance of these competencies, challenges persist in their effective integration into teacher training and educational practice. It is essential that teacher training programs adopt a holistic approach that combines theory, practice, and critical reflection, and that promotes the development of solid and contextualized digital competencies. Furthermore, it is necessary to foster a culture of continuous and self-directed learning that allows teachers to adapt to rapid technological changes and use digital tools in a critical and creative way to benefit their students' learning.

Limitations

Although this study provides valuable insights into the perceptions and experiences of students regarding digital competencies, it also has some limitations. One of the main limitations is the sample size, which is restricted to 31 students from a single university, which may limit the generalizability of the results. Additionally, since the study was based on a questionnaire with open-ended questions, there is a possibility that some responses may not fully reflect the participants' perceptions due to subjective interpretation of the questions.

Future Research

Future studies could expand the scope of this research by including a larger and more diverse sample of students from different universities and educational contexts. Furthermore, it would be useful to conduct longitudinal studies that explore how digital competencies develop and evolve over time in teacher training. Additionally, future research could focus on the effectiveness of specific interventions, such as practical workshops and mentoring programs, to improve the acquisition and application of digital competencies in teacher training.

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