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DIGITAL COMPETENCE OF TEACHERS IN THE USE OF ICT

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Annotation: This article examines the digital competence of teachers in effectively utilizing Information and Communication Technologies (ICT) in the educational process. It highlights the essential digital skills required for planning, delivering, and evaluating lessons in technology-rich environments. The paper also addresses professional development needs, challenges in technology adoption, and the role of institutional support in enhancing teachers' digital literacy. Emphasis is placed on how digital competence contributes to improved student engagement and learning outcomes.

Keywords: digital competence, ICT in education, teacher training, digital literacy, educational technology, professional development, technology integration.

I. Introduction

In the contemporary educational landscape, the integration of Information and Communication Technology (ICT) has become essential for fostering effective teaching and learning environments. Educators must cultivate digital competence to leverage various digital tools, ensuring they can engage students and improve educational accessibility. A critical exploration of teachers capabilities reveals a mixed proficiency; while many educators recognize the significance of technology in their pedagogical practice, their actual utilization remains limited, as suggested by findings from recent studies (Calderón et al., 2025)(Basri et al., 2025). Moreover, contrasting successful ICT integration strategies in countries like Rwanda and South Africa highlights persistent challenges faced by educators, particularly in contexts with inadequate resources (Kennedy et al., 2025). As digital literacy evolves, characterized by components such as information literacy and content creation, teachers must adapt to meet the demands of the digital age . Addressing these facets will ultimately refine the pedagogical practices necessary for nurturing a technologically adept student body.

A. Definition and Importance of Digital Competence in Education

Digital competence is increasingly recognized as a critical component of modern education, serving as the foundation for effective teaching and learning in an increasingly digital world. It encompasses a range of skills that include information and data literacy, communication and collaboration, as well as media and digital content creation, which are essential for navigating both academic and professional landscapes. As stated, Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society "Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and

competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking." (Council of the European Union). This multifaceted approach not only enhances educators instructional methods but also prepares students to thrive in a technology-driven society. The depiction in further illustrates the intricacies of digital skills necessary for effective educational practices, emphasizing the urgency for educators to cultivate these competencies to meet evolving pedagogical demands. Ultimately, the integration of digital competence into education plays a pivotal role in fostering a generation capable of critical thinking and innovation.

II. Current State of Digital Competence Among Teachers

The current state of digital competence among teachers reveals significant gaps in the integration of Information and Communication Technology (ICT) within educational practices. Research indicates that many educators possess only superficial knowledge of technological tools, with limited application in class preparation and teaching methods, especially in music education contexts (FAIZI R et al., 2025). Furthermore, factors such as inadequate training and insufficient access to digital resources hinder teachers overall effectiveness in using ICT (Calderón et al., 2025). As these challenges pervade the education landscape, the need for professional development and enhanced curriculum alignment becomes increasingly evident. Additionally, teaching practices in English as a Foreign Language highlight the critical role of digital media in improving communicative competence yet underline the barriers faced by educators (Sugiharto et al., 2025). Therefore, to foster deeper digital literacy and pedagogical skills, educational stakeholders must prioritize comprehensive training programs and robust infrastructure support, as evidenced by the conceptual framework for digital literacy .

Image1. Overview of Digital Literacy and Its Components

Metric	Percentage
Teachers who 'strongly agree' or 'agree' that ICT is considered a priority for use in teaching	86%
Teachers who 'strongly agree' or 'agree' that there is sufficient opportunity to develop expertise in	61%

ICT	
Teachers who 'strongly agree' or 'agree' that there is enough time to prepare lessons incorporating ICT	62%
Teachers who use ICT at school when teaching every day	50%
Teachers who 'strongly agree' or 'agree' that ICT enables students to access better sources of information	95%
Teachers who 'strongly agree' or 'agree' that ICT helps students develop greater interest in learning	92%
Teachers who 'strongly agree' or 'agree' that ICT helps students work at a level appropriate to their learning needs	92%
Teachers who 'strongly agree' or 'agree' that ICT improves academic performance of students	75%
Teachers who regularly use technology to present class instruction	64%
Teachers who regularly use technology to communicate with parents or guardians about students' learning	54%
Teachers who regularly use technology to provide remedial or enrichment support to individual or small groups of students	45%
Teachers who regularly use technology to reinforce skills through repetition of examples	44%
Teachers who 'agree' or 'strongly agree' that they talk to other teachers about how to use technology in their teaching	75%
Teachers who 'agree' or 'strongly agree' that they share technology resources with other teachers in the school	75%
Teachers who 'agree' or 'strongly agree' that they collaborate with colleagues on the development of technology-based lessons	50%+
Teachers who say digital devices are helpful to students' education	41%
Teachers who say digital devices are harmful to students' physical health	55%
Teachers who say digital devices are harmful to students' mental health	69%
Teachers who feel they are less knowledgeable than their students in using new digital technologies	42%
Teachers who feel they know more than their students in using new digital technologies	18%
Teachers who feel they and their students are on par in using new digital technologies	40%
Teachers who 'often' or 'very often' get ideas from	30%

their students for incorporating digital technologies into learning	
Teachers who say their school does a 'good job' providing resources and support for incorporating digital tools	62%
Teachers who say their school provides formal training on effectively incorporating digital technologies	68%

Digital Competence of U.S. Teachers

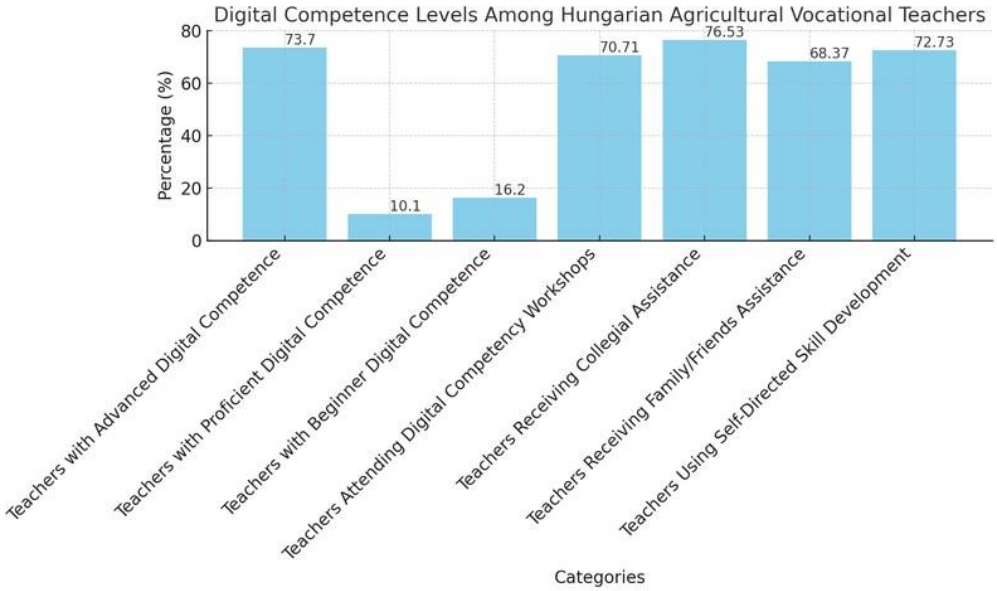
A. Assessment of Teachers' Skills and Knowledge in ICT

The assessment of teachers skills and knowledge in Information and Communication Technology (ICT) is crucial in fostering a digitally competent educational environment. Various studies indicate that educators often possess a moderate understanding of ICT, but face challenges in effectively integrating these tools into their teaching practices. For instance, many teachers have reported inadequate training and a lack of resources tailored for specific pedagogical applications, as highlighted in the findings regarding the use of ICT in teaching English pronunciation and music education (Almithqal et al., 2025)(Calderón et al., 2025). Moreover, the growing significance of digital skills in enhancing pedagogical content knowledge is evident, with teachers acknowledging a need for further professional development to effectively utilize learning management systems (Rahmawati A et al., 2025). The results underscore the importance of evaluations that not only assess technical competencies but also aim to identify gaps in teachers digital literacy, thereby promoting targeted support and development (Abdigapbarova et al., 2025). For a visual representation of the multifaceted nature of digital literacy among educators, see .

III. Impact of Digital Competence on Teaching and Learning

The integration of digital competency in instructional practices has become paramount in fostering effective teaching and learning. As educators increasingly utilize information and communication technology (ICT), their ability to leverage these tools with pedagogical awareness shapes the learning environment. Research indicates that Digital competence is a concept that is widely used and can be defined in different ways by researchers and policy makers "Digital competence is a concept that is widely used and can be defined in different ways by researchers and policy makers. In this study, teachers' digital competence is their ability to use ICT with proper pedagogical understanding and awareness of its impact on the students' learning process." (Nonmanut Pongsakdi, Arto Kortelainen, Marjaana Veermans). This underscores the necessity for teachers to possess not only technological skills but also an understanding of the pedagogical implications of these tools. For instance, studies reveal that university lecturers in Jordan encounter challenges incorporating ICT into their teaching approaches, hindering the potential for enhanced student engagement and understanding (Almithqal et al., 2025). Similarly, the use of online platforms by pre-service mathematics teachers has demonstrated that advanced digital skills correlate strongly with improved pedagogical content knowledge (Rahmawati A et al., 2025). Ultimately, elevating teachers digital competence can

significantly enrich students educational experiences, leading to greater conceptual retention and academic performance, particularly within science disciplines (Jiemuratova AA et al., 2025). Enhancing these competencies in music education further highlights the gap between available technologies and their effective implementation, marking a critical area for intervention (Calderón et al., 2025).



The chart illustrates the distribution of digital competence levels among Hungarian agricultural vocational teachers and their engagement in various forms of digital competency development. Notably, a high percentage of teachers exhibit advanced digital competence (73.7%) and participate in digital competency workshops (70.71%). The data also highlights the significant use of self-directed skill development (72.73%) and collegial assistance (76.53%), emphasizing the importance of collaboration and independent learning in enhancing digital skills for effective teaching.

A. Enhancing Student Engagement and Learning Outcomes through ICT

The effective integration of Information and Communication Technology (ICT) in educational contexts has the potential to significantly enhance student engagement and learning outcomes. By utilizing innovative digital tools and resources, educators can create interactive and dynamic learning experiences that cater to diverse learning styles and preferences. For instance, incorporating virtual laboratories and simulations allows students to explore complex concepts in a more tangible manner, which has been shown to improve retention and problem-solving skills (Jiemuratova AA et al., 2025). Additionally, in regions such as Iringa Municipal, the strategic adoption of ICT in schools not only facilitates better access to educational resources but also promotes equity among students, regardless of their socio-economic background (Sigalla et al., 2025). As teachers develop their digital competencies, they can leverage these technologies to foster collaborative environments that encourage active participation and critical thinking, ultimately yielding higher academic performance (Munandar A et al., 2025). The framework depicting essential digital skills emphasizes the competencies necessary for successful technology integration in education .

Image2. Overview of essential digital skills categorized by competencies.

IV. Conclusion

In conclusion, the digital competence of teachers is paramount in fostering effective learning environments driven by Information and Communication Technology (ICT). The findings illustrate that while educators exhibit varying levels of digital skills, substantial gaps remain, particularly in integrating technology into pedagogical practices. This inconsistency hampers the potential of ICT to enhance educational outcomes. Specifically, models emphasizing collaborative learning and active engagement, as highlighted in the research, could significantly bolster teachers' proficiency in using ICT effectively in their classrooms (Omrany H et al., 2025). Furthermore, educators well-being plays a critical role in this integration process, suggesting that supportive school cultures could facilitate the adoption of innovative teaching methods (Durrani N et al., 2025). Addressing these challenges requires targeted training, emphasizing digital pedagogies, as noted in studies exploring the realities of digital didactic competencies among teachers (Awais BE et al., 2025). Ultimately, enhancing teachers digital competence will lead to more resilient educational systems, positively impacting student learning outcomes (Angulo PS et al., 2025). The relevance of understanding digital literacy components is succinctly evidenced through professional expectations in the job market, as depicted in , emphasizing the urgency of this educational shift.

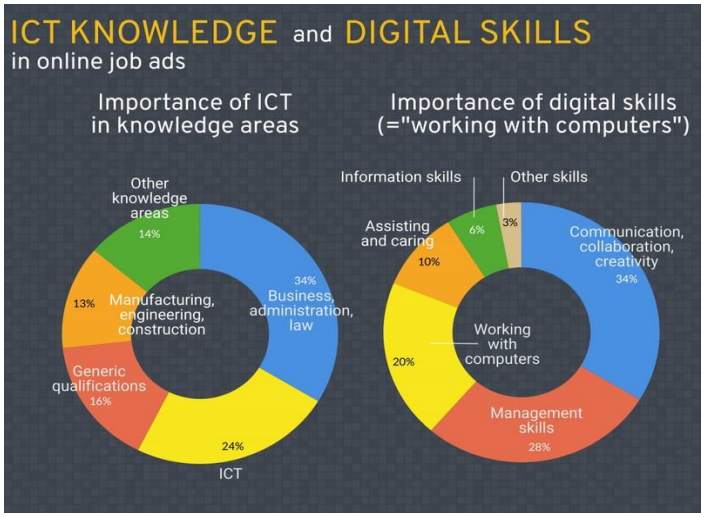


Image3. Importance of ICT and Digital Skills in Online Job Ads

A. Future Directions for Improving Teachers' Digital Competence in ICT

The path forward for enhancing teachers digital competence in Information and Communication Technology (ICT) necessitates a multifaceted approach that prioritizes continuous professional development and collaborative learning environments. As educators increasingly integrate digital tools into their teaching practices, professional training programs must focus not only on technological skills but also on pedagogical strategies that promote effective ICT use in the classroom. Mentorship programs, where experienced educators guide peers in using innovative digital resources, can foster a supportive learning culture and encourage knowledge sharing among staff (Asiyah et al., 2025). Additionally, leveraging frameworks like the one presented in , which emphasizes the interconnectedness of ICT knowledge and pedagogical methods, can provide a structured pathway for teacher development. To effectively address gaps in digital competence, future initiatives must also consider teachers' motivations and the evolving demands of the educational landscape, aligning professional goals with the needs of students and society (Altin et al., 2025). The intricacies of these dynamics underscore the importance of addressing both individual competencies and collective practices in professional growth efforts.

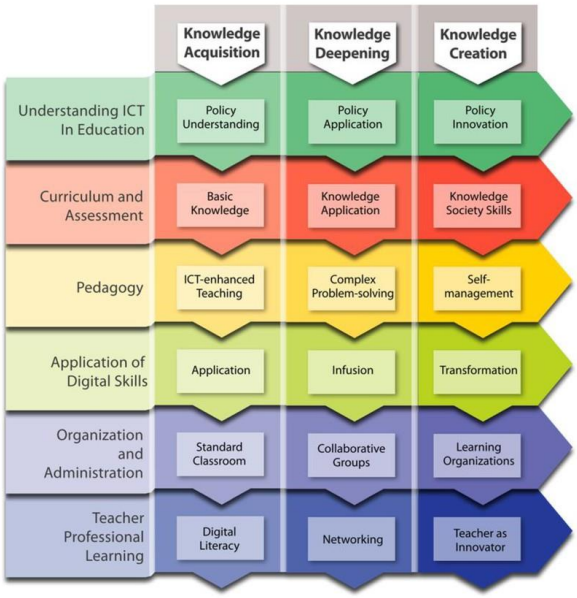


Image4. Framework for ICT in Education: Knowledge Acquisition, Deepening, and Creation

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