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Essential Teaching Skills and Strategies for Improving Teachers' Competence in Digital Era in Kogi State Polytechnic, Lokoja

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Highlights:
21st-century digital teaching requires computer/device use, digital material creation, LMS use, technology integration, and online assessment.
Lecturers' digital pedagogical competence is moderate, with strengths in designing interactive lessons but weaknesses in digital feedback.
Poor internet, inadequate devices, weak institutional support, and unstable power hinder digital teaching; regular ICT training and improved infrastructure are key improvement strategies.

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Abstract: The digital era has changed teaching and learning, making digital competence essential for effective classroom practice. This study examined the teaching skills needed for 21st-century classrooms, teachers' current digital pedagogical competence, institutional and infrastructural factors affecting digital teaching, and strategies for improvement. The study adopted a descriptive survey design and was carried out in the School of Management Studies, Kogi State Polytechnic, Lokoja. The population comprised 100 students and 50 lecturers, and the entire population was studied. Data were collected with a structured questionnaire titled Questionnaire on Digital Teaching Skill in the Digital Era (QDTSDE). Mean and standard deviation were used to answer the research questions. The findings showed that respondents agreed that effective digital teaching requires computer and device use, creation of digital instructional materials, use of learning management systems, technology integration, and online assessment. The respondents also indicated that teachers' digital competence is moderate, with stronger ratings for designing interactive digital lessons and lower ratings for providing feedback through digital platforms. In addition, poor internet access, weak institutional support, inadequate devices, and unstable power supply were identified as major barriers, while access to digital training was the only institutional factor rated positively. Regular ICT training, improved infrastructure, government funding, peer collaboration, and inclusion of digital skills in teacher education were recommended as strategies for improvement. The study concludes that digital teaching competence requires both teacher preparation and strong institutional support.
Keywords: Digital pedagogy, digital literacy, teacher competence, instructional technology, 21st-century skills.

Introduction

Teaching in the 21st century has fundamentally evolved due to digital transformation. Emerging educational technologies have reshaped pedagogical practices, emphasizing creativity, collaboration, communication, and critical thinking. Teachers are no longer mere transmitters of knowledge but facilitators of learning experiences that integrate technology to promote flexible, learner-centered engagement. As schools and universities migrate to hybrid and online learning environments, developing robust digital teaching skills has become essential (Castaneda & Selwyn, 2018). Despite this shift, many teachers in developing contexts remain inadequately prepared to use technology effectively in their classrooms (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2021). Access gaps, outdated curricula, and insufficient professional training have widened the digital divide and hindered effective teaching in the digital era (Koehler,

et al.,2013). The present study examines the range of teaching skills teachers employ in digital environments and explores how systemic supports training, infrastructure, and policy can enhance their competencies. This gap highlights the urgent need to re-examine and strengthen teaching skills in the digital era, ensuring that educators are adequately prepared to meet the demands of modern, technology-enhanced learning environments. Teaching in the digital era increasingly depends on teachers' digital competence, a combination of technical skills, pedagogical strategies, and professional dispositions for using technology to enhance learning (Xinghe, 2025).

Digital Technology refers to the use of electronic devices, computer systems, software applications, and internet-based resources to create, process, store, and communicate information. It involves the use of technological tools such as computers, smart phones, projectors, tablets, online learning platforms, and multimedia resources in carrying out educational and administrative activities. According to Selwyn (2016), digital technology in education involves the use of computer-based systems and internet technologies to support teaching, learning, communication, and knowledge sharing. Similarly, Bates (2019) explained that digital learning is the integration of technology into education to improve access to knowledge, student participation, and teaching effectiveness. The application of digital technology in institutions of learning has many benefits. It improves the quality of education, promotes independent learning, increases students' motivation, enhances communication between teachers and students, and provides access to unlimited educational information. According to UNESCO (2021), digital learning promotes inclusive and equitable quality education by allowing learners to access educational resources regardless of geographical location.

Furthermore, digital technology supports collaborative learning among students through online group discussions, virtual teamwork, and social learning platforms. It also prepares students for the modern workplace where digital skills are highly demanded. Despite these advantages, there are challenges affecting the effective use of digital technology institutions of learning. These challenges include inadequate electricity supply, poor internet connectivity, and lack of digital devices, insufficient ICT skills among teachers and students, and high costs of technological facilities. Digital technology has become an essential part of teaching and learning in modern educational institutions. It enhances effective communication, improves academic performance, support research activities, and prepares students for participation in the digital world. Therefore, institutions or learning should continue to promote the use of digital technology by providing adequate facilities, training, and internet access for both teachers and students. Empirical studies consistently indicate that many teachers possess only low to moderate levels of digital competence. Systematic reviews across both school and higher education contexts reveal that educators often struggle with advanced competencies such as digital assessment, content creation, and pedagogical integration of information and communication technologies. Similarly, lecturers and pre-service teachers are generally found to operate at intermediate levels of digital

competence, which are insufficient for leading innovative and transformative teaching practices (Basilotta-Gómez-Pablos *et al*., 2022).

Digital literacy is a foundational requirement for teachers in modern education systems. According to Aluko and Ooko (2022), digital literacy goes beyond basic computer skills to include the ability to access, evaluate, and create information using digital tools. Their study emphasizes that improving teachers' digital literacy significantly enhances classroom engagement and learning outcomes. Similarly, Van Dijk (2013) introduced the theory of the digital divide, explaining disparities in access, skills, and usage of digital technologies. This theory is relevant in understanding the challenges teachers face, particularly in developing regions, where access to digital infrastructure may be limited. UNESCO (2021) further expands the concept by advocating for a "new social contract for education," where digital competence is essential for inclusive and equitable education. The report highlights the need for teachers to adapt to digital transformations to ensure no learner is left behind. One of the most influential frameworks in digital teaching is the Technological Pedagogical Content Knowledge (TPACK) model. Mishra and Koehler (2006) introduced TPACK as a framework that integrates technology, pedagogy, and content knowledge to improve teaching effectiveness.

Koehler, Mishra, and Cain (2013) further clarified that effective teaching with technology requires an understanding of how these three knowledge domains interact. Teachers must not only know their subject matter but also how to teach it using appropriate technological tools. Herring, Koehler, and Mishra (2018) expanded this framework by providing practical applications and guidelines for implementing TPACK in educational settings. Additionally, Tondeur *et al*. (2017) developed validated instruments to measure teachers' TPACK, emphasizing its importance in teacher training and professional development.

Basilotta-Gómez-Pablos (2022) reveal a predominance of research that focuses on analyzing teachers' self-assessment and reflection of their digital competencies. Teachers recognize that they have a low or medium–low digital competence, as well as the absence of certain competencies, especially those related to the evaluation of educational practice. Castañeda and Selwyn (2018) argue that digitalization in higher education is not just about tools but involves broader institutional, cultural, and pedagogical changes. Their work emphasizes the need for critical reflection on how technology reshapes teaching practices rather than simply adopting new tools. Teachers' attitudes toward technology greatly influence its integration into teaching. Ogegbo and Aina (2020) found that early childhood teachers' perceptions of technology significantly affect how they use digital tools in classrooms. Positive perceptions lead to increased adoption, while negative attitudes hinder integration. Aluko and Ooko (2022) also support this finding, highlighting that professional development programs are essential in building teachers' confidence and competence in digital environments. The digital era has led to the emergence of new learning theories. Siemens (2005) proposed Connectivism as a theory that explains learning in a networked digital world. According to this theory, knowledge is

distributed across networks, and learning involves the ability to navigate and connect information sources. This perspective aligns with modern digital teaching practices, where students learn through online platforms, social media, and collaborative tools.

Research in digital education often employs qualitative and mixed-method approaches to capture complex teaching and learning dynamics. Braun and Clarke (2013) provide a practical guide for conducting qualitative research, particularly thematic analysis, which is widely used in educational studies. Creswell and Plano Clark (2017) emphasize the importance of mixed methods research in understanding both quantitative outcomes and qualitative experiences in digital education. Their approach allows researchers to gain a comprehensive understanding of how technology impacts teaching and learning.

Theoretical Framework

The study draws on the Technological Pedagogical Content Knowledge (TPACK) framework (Mishra & Koehler, 2006), which integrates three core teacher knowledge domains:

1. Content Knowledge (CK) – understanding the subject matter.
2. Pedagogical Knowledge (PK) – knowing how to teach effectively.
3. Technological Knowledge (TK) – understanding and using digital tools effectively.

The model emphasizes that effective digital teaching arises from the intersection of these domains, where technology enhances rather than displaces pedagogy. TPACK is particularly relevant in explaining variations in teachers' ability to integrate digital tools in meaningful learning activities (Herring *et al*., 2018). Complementing TPACK, the study also references Connectivism Theory (Siemens, 2005), which posits that learning occurs within networks of digital interactions. Teachers in digital contexts must therefore develop networked skills, curating, sharing, and co-creating content, to thrive in this connected landscape. The integration of digital technologies into education has transformed teaching and learning processes globally. However, despite this advancement, many educators still struggle to effectively adapt to the demands of the digital era. Traditional teaching methods remain dominant in many classrooms, limiting the potential benefits of technology-enhanced learning. A major problem is the lack of adequate digital competence among teachers, including insufficient skills in using digital tools, designing interactive content, and managing virtual learning environments. Many teachers have not received proper training in Information and Communication Technology (ICT), which affects their ability to deliver effective instruction in digitally supported classrooms. Infrastructural challenges such as poor internet connectivity, inadequate access to digital devices, and limited institutional support further hinder the adoption of digital teaching practices. These challenges are particularly evident in developing regions, where resources for digital education are often scarce.

Furthermore, there is a gap between pedagogical knowledge and technological application, as some teachers who are familiar with digital tools may not know how to integrate them effectively into teaching

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and learning processes. If these issues are not addressed, the quality of education may decline, and students may not acquire the necessary digital skills required in the modern world. Therefore, this study seeks to examine the essential teaching skills needed in the digital era and identify strategies for improving teachers' competence in digital instruction. Therefore the main purpose of this study is to examine the teaching skills required in the digital era and how these skills can be effectively applied to improve teaching and learning processes in modern educational environments. Specifically, the study aims to:

1. Identify the essential teaching skills needed by educators to function effectively in a technology-driven learning environment.
2. Examine the role of digital technologies in enhancing teaching methods and student learning outcomes.
3. Assess the level of digital competence among teachers, particularly their ability to integrate technology into pedagogy.
4. Determine strategies for improving teaching skills, including training, professional development, and institutional support.

Research Questions

1. What are the digital teaching skills required for 21st-century classrooms
2. What are the current levels of digital pedagogical competence among teachers?
3. What are the institutional and infrastructural factors that influence digital teaching skills?
4. What are the strategies that can improve teachers' skills in the digital-era?

Methodology

This study adopted a descriptive survey research design. According to Best and Kahn (2006), descriptive survey design is used to collect data in order to describe and interpret existing conditions. The design was considered appropriate because it enables the researcher to obtain and describe information on teachers' current digital teaching skills without manipulating variables. The population for the study was one hundred students and fifty lecturers from the different departments in the School of Management Studies, Kogi State Polytechnic, Lokoja. Due to the small size of the population, the entire population was studied; therefore, there was no sampling. The instrument for data collection was a structured questionnaire titled: Questionnaire on Digital Teaching Skill in the Digital Era (QDTSDE). Data for the study were collected with the help of two research assistants. Data collected were analysed using mean and standard deviation to answer research questions.

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Results

Research Question 1: What are the digital teaching skills required for 21st-century classrooms?

Table 1: Mean Rating of Respondents on the digital teaching skills required for 21st-century classrooms?

S/N	Item	Mean	SD	Decision
1	Ability to use computers and digital devices effectively	3.65	0.58	
2	Ability to create digital instructional materials (videos, slides)	3.52	0.62	
3	Ability to use learning management systems (LMS)	3.60	0.55	
4	Ability to integrate technology into teaching methods	3.70	0.50	
5	Ability to conduct online assessments	3.48	0.64	
	Grand Mean	3.59	0.58	

Table 1 shows that respondents generally agreed that several digital teaching skills are required for effective classroom practice in the 21st century. These include the ability to use computers and digital devices effectively (M = 3.65), create digital instructional materials such as videos and slides (M = 3.52), use Learning Management Systems (M = 3.60), integrate technology into teaching methods (M = 3.70), and conduct online assessments (M = 3.48). The ratings indicate that technology use is not limited to basic device operation alone; rather, it involves content creation, online delivery, assessment, and purposeful integration of digital tools into pedagogy. The cluster mean of 3.04 shows an overall agreement that these are essential skills for modern teaching. In simple terms, the respondents see the digital teacher as someone who can use tools, design learning materials, teach with technology, and assess learners online.

Research Question 2: What are the current levels of digital pedagogical competence among teachers?

Table 2: Mean Rating of Respondents on the current levels of digital pedagogical competence among teachers.

S/N	Item	Mean	SD	Decision
6	Teachers can effectively use digital tools in teaching	2.95	0.80	
7	Teachers are confident in managing virtual classrooms	3.05	0.68	
8	Teachers can design interactive digital lessons	3.20	0.60	
9	Teachers can provide feedback using digital platforms	2.85	0.75	
10	Teachers regularly update their digital skills	3.02	0.78	
	Cluster Mean	3.02	0.72	

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Table 2 reveals that the respondents perceived teachers' digital pedagogical competence to be fairly moderate. Teachers were rated as being able to use digital tools in teaching (M = 2.95), manage virtual classrooms (M = 3.05), design interactive digital lessons (M = 3.20), provide feedback using digital platforms (M = 2.85), and regularly update their digital skills (M = 3.02). While the scores are not low, they also do not suggest very high mastery. The cluster mean of 3.06 points to a generally acceptable but still developing level of competence. This means that teachers are not completely lacking digital skills, but many still need support to become more confident and more effective in using technology for teaching, feedback, and classroom management.

Research Question 3: What are the institutional and infrastructural factors that influence digital teaching skills?

Table 3: Mean rating on statement on institutional and infrastructural factors influencing digital teaching skills

S/N	Item	Mean	SD	Decision
11	Availability of internet facilities in schools	2.70		Rejected
12	Availability of digital devices (computers, projectors)	2.88		Rejected
13	Institutional support for ICT integration	2.95		Rejected
14	Access to digital training programs	3.05		Accepted
15	Stable power supply for digital teaching	2.60		Rejected
	Cluster Mean	2.84		Rejected

Table 3 shows that institutional and infrastructural support remains a major challenge. Respondents rejected availability of internet facilities in schools (M = 2.70), availability of digital devices such as computers and projectors (M = 2.88), institutional support for ICT integration (M = 2.95), and stable power supply for digital teaching (M = 2.60). Although access to digital training programmes was accepted (M = 3.05), the cluster mean of 2.84 was still rejected overall. The clear message from this table is that training alone is not enough. Even where teachers have some willingness to learn, weak internet, poor power supply, limited devices, and weak institutional backing reduce what they can actually do in practice.

Research Question 4: What strategies can improve teachers' skills in the digital era?

Table 4: Mean rating on strategies that can improve teachers' skills in the digital era

S/N	Item	Mean	SD	Decision
16	Regular ICT training for teachers	3.75		Accepted
17	Provision of modern digital infrastructure	3.80		Accepted
18	Government support and funding	3.68		Accepted
19	Peer collaboration among teachers	3.60		Accepted
20	Inclusion of digital skills in teacher education curriculum	3.72		Accepted
	Cluster Mean	3.71		Accepted

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Table 4 shows strong agreement on the strategies that can improve digital-era teaching skills. Respondents accepted regular ICT training for teachers (M = 3.75), provision of modern digital infrastructure (M = 3.80), government support and funding (M = 3.68), peer collaboration among teachers (M = 3.60), and inclusion of digital skills in teacher education curriculum (M = 3.72). The cluster mean of 3.69 indicates that these measures are seen as practical and necessary. In other words, the respondents are not asking for theory alone; they want training, facilities, funding, collaboration, and curriculum reform that will help teachers apply digital skills in real classroom situations.

Discussion of Findings

The findings show that effective teaching in the digital age now requires a wider set of competences than basic computer use. Respondents placed strong value on the ability to use digital devices, create instructional materials, operate Learning Management Systems, integrate technology into teaching, and conduct online assessment. This agrees with the view of Mishra and Koehler (2006) and Koehler et al. (2013) that good digital teaching depends on the careful blending of content, pedagogy, and technology. It also supports Bates (2019), who argues that teaching in a digital age demands deliberate design of learning experiences rather than simple use of gadgets.

The result further suggests that digital teaching has become a practical classroom necessity, not a luxury. When teachers can produce slides, videos, and online tasks, they make lessons more flexible and more engaging for learners. This position is consistent with UNESCO (2021), which stresses that education must prepare learners for participation in a changing digital world. In the same vein, Selwyn (2016) explains that digital technology in education should serve communication, access, and knowledge sharing, rather than merely display modernity. The present finding therefore shows that respondents understand digital teaching as purposeful instructional work. The result also reflects the broader shift in educational practice from teacher-centred transmission to learner-centred engagement. Digital skills now include the ability to guide students through online spaces, organise learning materials, and assess understanding in different formats. That is in line with Castaneda and Selwyn (2018), who argue that digitalisation involves deeper pedagogical change. The implication is that teachers need not only technical exposure but also the confidence to use technology in meaningful and educationally sound ways.

The findings indicate that teachers' digital pedagogical competence is moderate. Respondents agreed that teachers can use digital tools, manage virtual classrooms, design interactive lessons, provide feedback through digital platforms, and update their digital skills. However, the mean ratings suggest that these abilities are present at a useful but still developing level. This is broadly in line with Basilotta-Gómez-Pablos et al. (2022), who reported that many teachers only reach low to moderate levels of digital competence, and, who found that intermediate competence remains common even where attitudes to technology are positive.

Mishra and Koehler (2006) and Herring et al. (2018) both emphasise that effective technology use comes from the intersection of technological knowledge, pedagogical knowledge, and content knowledge. The present finding therefore implies that while teachers may know how to use tools, they may still struggle to connect those tools to lesson objectives and subject content in a deep and consistent manner.

The finding also aligns with Ogegbo and Aina (2020), who showed that teachers' perceptions and confidence levels shape how well they use technology in teaching. Similarly, Aluko and Ooko (2022) argue that digital literacy must go beyond casual device use and develop into professional competence through guided support. In this sense, the moderate level observed in the study should not be read as failure, but as evidence that teachers are at a transitional stage. They have some capacity, but they still need structured support before they can function as fully confident digital educators.

The findings on institutional and infrastructural factors show that the environment for digital teaching is weak. Respondents rejected the availability of internet facilities, digital devices, institutional support, and stable power supply, although training opportunities were accepted. This points to a major gap between the desire to teach digitally and the actual conditions needed to do so. The result strongly supports Van Dijk's (2013) digital divide theory, which explains that inequality in digital access is not only about ownership of devices, but also about reliable and meaningful use of digital resources. UNESCO (2021) similarly argues that equitable education requires enabling conditions, not just policy statements.

The implication is that digital teaching competence cannot grow properly in a poorly supported environment. A teacher may be willing to use technology, and even have some training, but still be unable to practise effectively because the school lacks the necessary infrastructure. This agrees with Selwyn (2016) and Castaneda and Selwyn (2018), who stress that digital education is shaped by wider institutional and cultural conditions, not just by individual effort. In that sense, the result shows that the problem is systemic, not merely personal.

This finding also helps to explain why some digital training programmes produce limited results. When internet service is poor, power supply is unstable, and devices are inadequate, teachers cannot translate their knowledge into classroom practice. Koehler et al. (2013) and Herring et al. (2018) note that technology integration becomes meaningful only when the context supports its use. Therefore, the present result suggests that any serious attempt to improve teaching in the digital era must first tackle the conditions that make digital teaching possible. Without that, competence development will remain shallow and uneven.

The findings on improvement strategies are quite clear: respondents strongly support regular ICT training, modern digital infrastructure, government funding, peer collaboration, and the inclusion of digital skills in teacher education curricula. This is an encouraging result because it shows that the respondents are not only identifying the problems, but also pointing to workable solutions. It agrees with Aluko and Ooko (2022), who emphasise the value of strengthening teachers' digital literacy through intentional support, and with

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Tondeur et al. (2017), who show that competence grows best when it is developed through structured and validated training processes.

The result also fits well with the TPACK framework. If digital teaching requires the integration of knowledge, pedagogy, and technology, then teacher preparation must be continuous and practical. Herring et al. (2018) and Mishra and Koehler (2006) both suggest that teachers need more than introductory exposure; they need repeated opportunities to connect technology with real teaching situations. The respondents' preference for training, curriculum reform, and infrastructure therefore supports the idea that digital competence is not built in isolation. It is built through guided practice and institutional backing.

Peer collaboration is another important point here. Teachers often learn best when they share resources, compare classroom experiences, and solve problems together. This is close to the logic of Connectivism, where learning happens through networks and interaction. Siemens (2005) support the idea that digital learning thrives in connected environments where knowledge is exchanged rather than kept private. The finding therefore suggests that professional learning communities, mentorship, and collaborative training should be built into the digital capacity-building process.

Conclusion

Teachers in the digital era require a balanced blend of technological, pedagogical, and adaptive skills. Digital technology has become an essential part of teaching and learning in modern educational institutions. It enhances effective communication, improves academic performance, supports research activities, and prepares students for participation in the digital world. Therefore, institutions of learning should continue to promote the use of digital technology by providing adequate facilities, training, and internet access for both teachers and students. The study concludes that although teachers are enthusiastic about digital innovation, they face multidimensional barriers that hinder effective technology integration.

Recommendations

The following recommendations were made:

1. There is a need for continuous and practical digital capacity-building programmes for teachers.

2. Educational institutions and relevant government agencies should invest more in digital infrastructure to create an enabling environment for technology-enhanced teaching.

3. Teacher education programmes should be restructured to place greater emphasis on digital pedagogy and technology integration.

4. Schools should encourage collaboration among teachers through professional learning communities and peer-support networks.

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