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Assessment of Nigerian Teacher Educators' Strategies for Professional Digital Competent Development

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Abstract

This study investigated the digital competence of Nigerian teacher educators at Michael Okpara University of Agriculture Umudike, (n=136) and Alvan Ikoku Federal University of Education, Owerri (n=191, 20% sample via purposive sampling) in Nigeria. Data were collected using an 18-item "Teacher-Educators Questionnaire on Teacher Educators' Strategies for Professional Digital Competence" (TOEPG), validated by three experts and achieving a Cronbach's alpha of 0.85. Findings revealed relatively high levels of digital competence but highlighted significant shortcomings in current professional development programs. Teacher educators expressed a strong need for more comprehensive, context-specific, and sustained professional development that incorporates collaborative learning and equitable access to resources. A key recommendation is the development and implementation of robust, ongoing professional development programmes tailored to the specific needs and challenges faced by Nigerian teacher educators.

Keywords: Assessment, Nigerian teacher educators, ' strategies, professional, digital competent, development

Introduction

Digital competence is complex and multi-dimensional; it refers to a range of skills, knowledge, and attitudes needed by individuals to effectively use digital technologies in various contexts. The European Commission (2018) has identified five key components of digital competence, namely information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. Put together, these elements provide the very foundation for digital literacy and form the basis upon which educators effectively integrate technology into their teaching practices. The information and Data Literacy component refers to the ability to search, evaluate, and manage digital information efficiently. Teachers should be able to identify credible sources, understand the content in digital format, and use it to enhance teaching and learning. These skills are very significant for Nigerian teacher educators, with the increasing availability of digital resources for them to exploit in their work as noted by Redecker (2017).

Being able to communicate and collaborate using digital tools with students, parents, and colleagues is an important skill. This involves being able to communicate through e-mails, social

networking, and collaboration platforms like Google Classroom or Microsoft Teams. Improvement in these skills among Nigerian teacher educators can thus promote effective communication and collaborative teaching methods. Content Creation in Digital Environments assumes the competency to create, produce, and manage digital content: text, images, and multimedia. One should also be aware of how copyright is respected and intellectual property is protected. In this respect, for example, Nigerian teachers who can become competent in this, may produce culturally relevant and engaging learning resources. Safety covers those areas concerning the protection of devices, personal data, and privacy in digital spaces. Also, teachers need to address ethical issues and encourage responsible digital citizenship. Safety has been considered an issue in the Nigerian context where levels of digital literacy are large. Problem-Solving: The ability to make use of digital tools for technical problem-solving, adapt new technologies, and thereby creatively solve learning problems is essential. It ensures that teachers can find their way and maximize their use of digital tools to enhance educational outcomes. Digital competence has grown to be the clear basis for education in the 21st century because of the influence of the wide digital shift throughout the sectors of life. In modern educational processes, digital competence is not an extra skill but a very intrinsic part of teaching and learning. It encompasses a set of skills and knowledge that concern the effective use of digital tools; understanding digital content; and creating and sharing of digital information responsibly.

Digital Competence by Ferrari (2013), in the field of education, there are several key drivers for the integration of digital competence. First, the rapid advance in technology and its presence in daily life have placed an imperative for students to develop digital skills to be at par with the digital world. The European Commission (2018) describes digital competence as a "key area of priority for the learning of employability, personal development, and active participation in society". That being so, educators should be competent in digital skills to better equip the students for the challenges ahead. Secondly, practical experience shows that digital technologies integrated into the teaching process have a positive impact on teaching and learning experiences. Digital tools may promote personalized learning, offer collaborative opportunities, and access to a wide range of resources and information. Research indicates that digitally competent teachers make better use of technology in their teaching and have more advantages, as reflected in the often-better results from their students (Gudmundsdottir & Hatlevik, 2018).

Furthermore, the COVID-19 pandemic has given a glimpse into how essential digital competence is in securing continuity within education. It also made the sudden shift to remote and hybrid learning models bringing forth the need for educators to be proficient in the usage of digital platforms and tools. This has accelerated the adoption of digital technologies in education, with digital competence assuming the front burner in the agenda of educational institutions in recent times around the world (OECD, 2020).

In this perspective, the place of digital competence is even more important in developing countries like Nigeria. Besides such challenges as underdeveloped technology and infrastructure, developing educators' digital competence can help bridge educational gaps and improve the quality of education. Programmes that enhance digital literacy among teacher

educators in Nigeria are important in training them to use technologies in working life and creating a pool of digitally literate students.

Digital competence among teachers has elicited unique challenges and opportunities in Nigeria. Generally, the country's education system faces several constraints that include inadequate access to digital infrastructure, seriously ill-thought-out training programs, and large disparities between urban and rural areas. Each of these factors put Nigerian teachers at generally lower levels of digital competence compared with other teachers in more developed regions. A study conducted by Ajayi and Ajayi 2021 showed that many teachers in Nigeria lack basic digital literacy that would help them in the classroom to use technology appropriately. It has been attributed to several factors that include but are not limited to a shortage of professional development programs, inadequate funding for educational technology, and lack of policy implementation at a national level. Moreover, these are exacerbated seriously by the digital divide in particular for teachers in rural areas that have limited access to the internet and digital devices.

In spite of these, there has been the fronting of continuous efforts by various stakeholders for better improvement in their digital competencies. Initiatives such as the Digital Literacy Programme for Teachers by the Federal Ministry of Education give a push toward teaching at large, equipping teachers with the necessary skills to integrate digital technologies into their teaching practice. All this has been possible through collaboration with international organizations for partnerships and the involvement of the private sector to offer training and other related resources to teachers.

Addressing the digital competence gap among teachers can only be done from a multi-level point of view. Continuous professional development for teachers will help them to be abreast of technological advancement and integrate digital tools into teaching. Evidence of research on ongoing, context-specific CPD supports hands-on training, opportunities for collaborative learning, and resources as highly significant for the same (Redecker, 2017 & Uwadiae, 2020).

The strategies through which professional digital competence is developed among teacher educators within Nigeria should first be underpinned by an idea of their current levels of digital competence and what needs improvement. This will, in turn, enhance the assessment to inform the development of professional enhancement programs in specific needs that best allow them to use the integration of digital technologies into their teaching. Indeed, studies have indicated that usually, teacher educators from Nigerian universities hardly receive adequate training or support to develop such digital competencies fully. In the same vein, Ajayi and Ajayi (2021) emphasized that very few professional development programs comprehensively cover all the five components of digital competence. Most teachers report the need to have more practical training and experience in digital tools. Ajayi & Ajayi, 2021

Knowledge of the theoretical underpinning frameworks of digital competence and professional development is important to provide a basis on how best to assess and improve the strategies that teacher educators in Nigeria employ. These provide a framework within which digital skills

can be developed and ways of ensuring the integration of technology in teaching practices are done effectively. The SAMR model, developed by Puentedura (2018), provides a means to evaluate and enhance technology integration in teaching. This model has articulated four levels of technology integration, namely: Substitution - Technology acts as a direct substitute for traditional tools, with no functional change. Augmentation - Technology acts as a direct substitute, but with functional improvements. Modification - Technology allows for significant task redesign. Redefinition Technology enables new tasks that previously could not even have been imagined. The SAMR model leads Nigerian teacher educators in analyzing where they currently stand about integrating technology and where they can be to further enhance their status. Professional development programs will eventually help educators move from simple substitution to more transformative uses of technology that will lead to improved teaching and learning results.

Wenger's original CoP theory (1998) focuses on the social act of learning and the shared knowledge in a group situation. A CoP "is a shared domain of human endeavor" where members interact and engage in a process of collective learning. Area of interest or practice domain. Group of people-community. It is the mutual repertoire of resources, experiences, and strategies. CoP implementation among Nigerian teacher educators will allow collaborative learning to take place and facilitate the development of digital competence. These CoPs will also enable educators to share best practices, discuss challenges, and work out innovative strategies for integrating digital tools within the routine of teaching. These can be embedded within the respective professional development strategies for the teacher educators in Nigeria to build their digital competence and improve the infusion of digital tools in teaching. Indeed, with sustained technology integration, the skill of digital competence is not optional anymore but an important one that all educators across the world have to master.

Literature on the development of aspects of digital competence among teachers has reported triumphs and continuing setbacks. In Europe, much research has been carried out on this issue of the digital competence of educators within the framework provided by the European Commission's DigCompEdu. These skills have to do with creating digital resources, communicating effectively by means of digital tools, and developing students' digital competence. Digital competence is, of course, more important than it ever has been. Researchers have shown that, while a majority of Europe's teachers are generally digitally competent, there is generally a digital divide between the majority who have low-order competencies and the minority who possess higher-order competencies, especially in pedagogical integration (Pettersson, 2018). The current North American focus has been on integrating digital tools into curriculum and instruction.

Scholars have identified that professional development opportunities have played a key role in teachers enhancing their digital competence. For instance, the TPACK framework of Koehler and Mishra (2009) has been popular in leading the design of professional development about technology, pedagogy, and content knowledge. However, these are not complete, especially in terms of sustained support and context-specific training (Harris, Mishra, & Koehler, 2009).

Recently, rapid technological changes have spurred significant investments in teachers' digital competencies in Asia. Already studies on countries such as South Korea and Singapore prove that structured and government-supported professional development programs significantly improve the digital skills of teachers. However, other challenges remain present, such as unequal access to technology and disparities in initial levels of competence. In Nigeria, digital competencies are not as developed as in other more developed regions.

All these are compounded by other issues, such as inadequate infrastructure, limited access to technology, and lack of professional development opportunities. Studies have indicated that even basic digital skills are not available to most Nigerian educators. For example, Yusuf and Balogun (2011) reported that most teachers in Nigeria had limited access to digital tools, and significant barriers curtailed their inclusion of technology in teaching. In addition to this, Ololube (2006) pointed out that such professional development programs should provide comprehensive acquisition and pedagogical use of digital skills comprehensively. Any improvement in digital competency within Nigeria has been very sporadic; most developments have been unstructured. As an example, the National Policy on Information and Communication Technology in Education was set up to increase the degree of digital literacy. Its implementation, however, has remained incomplete (Federal Ministry of Education, 2019). Moreover, most are short-term and cannot provide long-term support, which is very necessary in schools for technology integration. Although the existing literature gives valuable insights into the global and Nigerian states of digital competence and professional development at large, several gaps still exist. There are no context-specific strategies that address many of the unique challenges Nigerian educators face. Most of these programs do not take into consideration the infrastructural and socio-economic challenges present in schools within Nigeria. Rarely would any sustained comprehensive teacher training in digital skills integrated with pedagogical practices have been conducted in Nigerian schools. What is therefore needed are those long-term programs that go beyond basic competencies in digital skills into advanced ones, with their applications in different educational settings. There is, consequently, a shortage of particular empirical data on the perceptions, needs, and professional development needs of Nigerian teacher educators concerning the status of digital competence. These are all those things needed for effective interventions to be designed. A few studies have assessed the effectiveness of the existing professional development programmes in enhancing digital competence amongst Nigerian educators. The effect of these programs must be evaluated to bring out the best practices and points that need improvement.

Research questions

1. What is the current level of digital competence among teacher educators at MOUAU and AIFUE?
2. What specific needs and challenges do teacher educators at MOUAU and AIFUE face in developing their digital competence?

3. How effective are the current professional development programs in enhancing the digital competence of teacher educators at MOUAU and AIFUE?

4. What strategies can be implemented to improve the digital competence development of teacher educators at MOUAU and AIFUE?

Research methods

This study aimed to investigate teacher educators' perceptions of strategies for professional digital competent development. This is a descriptive research design. The study involved the School of Education at MOUAU, with a population of 136 academic staff, and the School of General Education, Alvan Ikoku Federal University of Education, Owerri (AIFUE), with a population of 709 academic staff. The entire academic staff of the School of Education at MOUAU was used as the sample due to the small population size. A purposive sampling technique was employed (participants are selected based on specific characteristics or criteria relevant to the study's objectives) for AIFUE, selecting 191 academic staff from the School of General Education, resulting in a total sample of 327 teacher educators. The number represents 20% of academic staff in the two universities. The Data were collected using a questionnaire titled "Teacher-Educators Questionnaire on teacher educators' strategies for professional digital competent " (TOEPG). This 18-item questionnaire was designed by the researchers and validated by three experts from the Departments of Computer and Robotic Studies at AIFUE. The instrument consists of five parts: 1. Demographic information of respondents, 2. Importance of English Language Skills in G &C studies, 3. Challenges in Addressing English Language Needs of G & C students, and Effective Strategies for Language Development.

The questionnaire items used a four-point Likert scale: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), scored as 4, 3, 2, and 1, respectively. The instrument's face validity was confirmed by four experts from the relevant department at AIFUE, and it underwent trial testing with 36 lecturers outside the study population, achieving a Cronbach's alpha reliability coefficient of 0.85. The questionnaire was administered with the assistance of two trained research assistants, ensuring a 100% response rate. Data were analyzed using mean and standard deviation to address the research questions, with a decision rule that any mean score of 2.50 or above was accepted, while scores below 2.50 were rejected. Hypotheses were tested using the t-test statistic at a 0.05 level of significance.

Table 1: Average Perception Scores and Standard Deviations on Teacher Educators on the current level of digital competence among Nigerian teacher educators

S/N	ITEM STATEMENT	MOUAU			AIFUE LECTURES		
		$\bar{x}$	SD	REM	$\bar{x}$	SD	REM

1	I feel confident in my ability to search and evaluate digital information effectively	3.17	0.75	Accept	3.24	0.68	Accept
2	I am proficient in using digital tools for communication with students and colleagues.	3.41	0.53	Accept	3.23	0.50	Accept
3	I can create and manage digital content such as text, images, and multimedia	3.02	0.41	Accept	3.10	0.50	Accept
4	I am aware of and follow best practices for online safety and protecting personal data.	2.51	0.44	Accept	2.53	0.45	Accept
5	I can effectively use digital tools to solve technical problems in the classroom	3.12	0.54	Accept	3.20	0.51	Accept
	Total average	3.12	0.56	Accept	3.16	0.55	Accept

Both MOUAU and AIFUE teacher educators demonstrate a relatively high level of digital competence across the assessed areas. The means are above the midpoint (assuming a scale of 1-5), indicating acceptance of their digital skills. The standard deviations are relatively low, suggesting a consistent level of competence among the educators within each institution. The slight difference in average means between the two institutions is minimal and may not be statistically significant without further analysis.

Table 2: Average Perception Scores and Standard Deviations on the specific needs and challenges faced by Nigerian teacher educators in developing their digital competence

S/N	ITEM STATEMENT	MOUAU			AIFUE LECTURES		
		$\bar{x}$	SD	REM	$\bar{x}$	SD	REM
6	I have adequate access to digital tools and resources for teaching.	3.67	0.69	Accept	3.62	0.68	Accept
7	I receive sufficient support and training to develop my digital skills.	3.80	0.76	Accept	3.82	0.74	Accept

8	The infrastructure in my institution supports the effective use of digital technologies	3.64	0.61	Accept	3.67	0.50	Accept
9	I face challenges in integrating digital technologies into my teaching due to lack of resources	3.51	0.64	Accept	3.53	0.62	Accept
10	Professional development programmes do not fully address my needs in digital competence	2.31	0.41	Reject	2.30	0.39	Reject
	Total mean average	3.51	0.65	**Accept**	3.53	0.64	**Accept**

The high average means suggest that teacher educators at both institutions perceive a significant need for improved access to resources, support, and training in digital skills. The relatively high standard deviations indicate some variability in perceptions among educators regarding these needs. The low mean for item 10 ("Professional development programs do not fully address my needs in digital competence") is particularly noteworthy and suggests a key area for improvement in professional development programmes.

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S/N	ITEM STATEMENT	MOUAU			ALVAN LECTURES		
		$\bar{x}$	SD	REM	$\bar{x}$	SD	REM
11	professional development programmes I have attended have significantly improved my digital skills	3.09	0.65	Accept	3.20	0.68	Accept
12	I find the content of professional development programmes relevant to my teaching needs	3.40	0.66	Accept	3.42	0.61	Accept
13	The duration and frequency of professional development programs are adequate	3.51	0.61	Accept	3.46	0.60	Accept

14	I have opportunities to practice and apply what I learn in professional development programmes	3.45	0.64	Accept	3.45	0.62	Accept
	Total mean average	3.37	0.64	**Accept**	3.38	0.63	Accept

Table3. Shows that the average means indicate a generally positive perception of the effectiveness of professional development programmes. However, the means are still below "4" (on a presumed 1-5 scale), suggesting that there's room for improvement. The relatively low standard deviations show that opinions on the effectiveness of the programmes are fairly consistent within each institution.

Table 4: Average Perception Scores and Standard Deviations on the strategies can be implemented to improve the professional digital competence development of Nigerian teacher educators.

S/N	ITEM STATEMENT	MOUAU			ALVAN LECTURES		
		$\bar{x}$	SD	REM	$\bar{x}$	SD	REM
15	Collaborative learning and sharing of best practices would enhance my digital competence	3.47	0.61	Accept	3.52	0.63	Accept
16	Continuous and context-specific professional development programs would better meet my needs	3.40	0.66	Accept	3.42	0.64	Accept
17	Providing equitable access to digital tools and resources is essential for improving digital competence	3.51	0.61	Accept	3.46	0.60	Accept
18	Integrating digital competence frameworks (such as SAMR or DigCompEdu) into professional development would be beneficial.	3.40	0.64	Accept	3.43	0.59	Accept
	Total mean average	3.45	0.63		3.46	**0.62**	

The high average means indicate strong support for the proposed strategies to enhance digital competence development. The strategies listed appear to resonate with the needs expressed in Table 2. The low standard deviations indicate a high degree of agreement among educators regarding the value of these strategies.

Discussion

This study investigated the digital competence of teacher educators at Michael Okpara University of Agriculture, Umudike (MOUAU) and Alvan Ikoku Federal University of Education, Owerri (AIFUE), Nigeria. The findings, presented in Tables 1-4, reveal a complex picture aligning with several perspectives from the reviewed literature. **Table 1** shows that both MOUAU and AIFUE teacher educators exhibit relatively high levels of digital competence across the five key components identified by the European Commission (2018): information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. The mean scores above 2.50 across all components indicate acceptance of their digital skills. This contrasts somewhat with the findings of Ajayi and Ajayi (2021), who reported a lack of basic digital literacy among many Nigerian teachers. The discrepancy might be attributed to the sample selection focusing on teacher *educators*, who may have higher digital literacy than classroom teachers. The relatively low standard deviations suggest a consistent level of competence within each institution. **Table 2** highlights the perceived needs and challenges. While teacher educators report adequate access to digital tools and resources (items 6, 7, 8), a significant concern emerges regarding the inadequacy of professional development programs (item 10). This aligns with Ajayi and Ajayi (2021)'s observation that few professional development programs comprehensively cover all five components of digital competence. The high mean scores for items 6, 7, and 8 suggest that while resources and support are perceived as available, the effectiveness of their application is hindered by the shortcomings of professional development. This resonates with Redecker (2017) and Uwadiae (2020), who emphasize the importance of context-specific, hands-on training and collaborative learning opportunities in effective CPD.

Table 3 assesses the effectiveness of current professional development programs. While the positive perception of program effectiveness is evident (means above 2.50), the scores remain below 4, indicating room for improvement. This confirms the need for more comprehensive and sustained professional development, as suggested by Harris, Mishra, & Koehler (2009) regarding the TPACK framework's limitations. The consistency of opinions (low standard deviations) suggests a shared experience of the programs' strengths and weaknesses. **Table 4** explores strategies for improvement. The high average means across all items demonstrate strong support for collaborative learning, continuous and context-specific professional development, equitable access to resources, and the integration of competence frameworks like SAMR or DigCompEdu. These recommendations align with the theoretical frameworks discussed, such as Wenger's Communities of Practice (1998) and the SAMR model (Puentedura, 2010), emphasizing the importance of collaborative learning and structured approaches to technology integration.

Conclusion

The study reveals a relatively high level of digital competence among teacher educators at MOUAU and AIFUE, but significant gaps exist in professional development. While access to resources and support is perceived as adequate, current professional development programs fall short of comprehensively addressing the needs of teacher educators across all five components of digital competence. The findings strongly support the implementation of collaborative learning, continuous and context-specific professional development programs, equitable access to digital tools and resources, and the integration of established digital competence frameworks into professional development initiatives.

Recommendations

1. Nigerian University authorities should develop and implement context-specific, sustained professional development programs that comprehensively address all five components of digital competence, incorporating hands-on training and collaborative learning opportunities.
2. Nigerian University authorities should establish Communities of Practice (CoPs) among teacher educators to facilitate knowledge sharing, collaborative problem-solving, and the development of innovative strategies for integrating digital tools into teaching.
3. Nigerian government through her relevant authorities should ensure equitable access to digital tools and resources, particularly addressing the digital divide between urban and rural areas.
4. Nigerian University authorities should integrate digital competence frameworks, such as SAMR and DigCompEdu, into professional development programs to provide a structured approach to technology integration and assessment.
5. Nigerian University authorities should evaluate the effectiveness of professional development programmes regularly to identify best practices and areas for improvement, using both quantitative and qualitative data collection methods.

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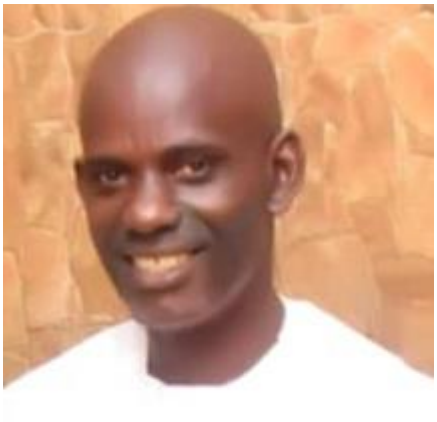
About Author



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As an active member of prestigious academic organizations such as the Curriculum Organization of Nigeria (CON), World Council for Curriculum and Instruction (WCCI), and the Teacher Registration Council of Nigeria, Dr. Eke is deeply engaged in shaping educational policies and practices. His areas of expertise include integrating technology in language instruction, addressing climate change and sustainable development in the curriculum, and promoting learner autonomy and collaborative learning strategies.

With a strong focus on practical, evidence-based solutions, Dr. Eke has demonstrated his ability to translate research into impactful classroom practices. He is passionate about empowering teachers and developing innovative instructional approaches that foster student success and community engagement. His work has been recognized with several awards, including the Young African Leaders Journal of Development Certificate of Outstanding Contributions in Research and the Students' Union Government AlvanIkoku Federal College of Education Award of Outstanding Lecturer of the Year.

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