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The Evolving Role of University Faculty in the Age of Digital Intelligence: A Study of Nigerian Universities

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Abstract

Digital intelligence technologies have rapidly evolved to revolutionize higher education, changing the roles and skills needed for the university educator. In the Nigerian university context, however, issues remain about the level of adoption of digital intelligence tools, digital competence among faculty members and preparedness to new academic roles. This study thus explored the changing nature of university faculty in the era of digital intelligence in Nigerian Universities. A descriptive survey research design was used. The population consisted of faculty members in Nigerian universities and a sample of 900 faculty members in 18 universities in the six geo-political zones were selected. Data were gathered with a structured questionnaire and reliability coefficient was 0.951. To address the research questions, mean and standard deviations were used and to test the research hypotheses at 0.05 significance level, Pearson correlation and multiple regression were used. The results showed a high level of digital intelligence tool adoption (Grand Mean = 3.67), a high level of digital competence (Grand Mean = 3.73), and significant changes in the role of faculty (Grand Mean = 3.86). The adaptation of faculty into their new roles was also high (Grand Mean = 3.86). The analysis of digital competence with tool adoption revealed a positive strong correlation ($r = 0.782$, $p < 0.05$) with digital competence. Demographic characteristics were found to be significantly related to adaptation when multiple regression was conducted ($R^2 = 0.549$, $F = 116.52$, $p < 0.05$). The research findings suggest that the Nigerian universities are experiencing significant digital transformation, but there are still gaps in their higher-order digital intelligence skills. It calls for continued investments in ICT infrastructure and ongoing professional development in AI and data literacy as well as institutional policies that facilitate digital innovation in teaching and research.

Introduction

With the swift progress of digital technologies, the education sector has been no exception, as it has been transformed in almost every aspect of society. Digital intelligence has been growing in its popularity among universities around the world and is more than just digital literacy, it is the ability to use, manage, evaluate and innovate with digital technologies, artificial intelligence (AI), data analytics and interconnected digital systems in ethical and effective ways (Park, 2019; Ng et al., 2021). Digital intelligence is now a key enabler of innovation in teaching, productivity in research, the sharing of knowledge and competitiveness of higher education institutions in today's education landscape. Consequently, universities are undergoing dramatic transformations of faculty members' roles and responsibilities in response to the expectations of the digital age (Bond et al., 2018; Zawacki-Richter et al., 2019).

In the past, the main roles of the university faculty were to teach, do research and serve society. Their work was primarily focused on passing along knowledge: in classrooms, in the field of scholarship, and in the work of social development programs. But, with the advent of digital technologies, learning platforms, learning management systems, applications for artificial intelligence, and educational analytics, the academic landscape has been radically changed (Selwyn, 2019). Instructors are moving

beyond being merely teachers or professors toward roles as facilitators of learning, instructional designers, digital mentors, data-informed educators, and innovators who can integrate the latest technologies into their educational and research practices (Crompton & Burke, 2023). This shift reflects the larger movement towards teacher-centered to learner-centered and technology-based models of education.

The COVID-19 pandemic only further spurred the digitalization of higher education globally. Thanks to the necessity of using remote and hybrid learning, universities had to accept a new way of teaching and assessment, communicating with students and providing them support that is entirely dependent on the use of digital technologies, unprecedented in their history (Crawford et al., 2020). While many have transitioned to in-person learning, the digital habits that developed during the pandemic have sustained academic life and expectations. In addition to their content knowledge, faculty are now required to have heightened digital skills to effectively utilize AI tools in the field of education and attend to the ever-evolving needs of students, who are growing multifaceted and diverse (UNESCO, 2023).

The use of digital technologies in higher education is growing in Nigeria in recent years. The e-learning platform, virtual collaboration tools, digital libraries, and technology-driven administrative systems have been introduced into the educational delivery and the effectiveness of universities (Adeleke et al., 2022). However, the extent of faculty who have embraced digital intelligence tools and who have adjusted to new roles is variable from one institution to another. Despite the significant progress made in digital transformation, various challenges persist in the process, including poor digital infrastructure, lack of professional development opportunities, inconsistent institutional support, and technological readiness disparities, all of which hinder the full realization of digital transformation in Nigerian universities (Aina et al., 2023; Okoye et al., 2024).

The idea of digital competence has gained growing significance in the context of faculty members' reactions to technological change. Digital competence refers to "the knowledge, skills, attitudes, and ethical awareness needed to effectively use digital technologies in professional settings" (Redecker, 2017; Falloon, 2020). Research indicates that faculty who exhibit greater digital competencies are more likely to embrace and use innovative technologies in meaningful ways to support students' learning and teaching practices (Cabero-Almenara et al., 2021; Scherer et al., 2021). Competence differences, however, between faculty may impact how well they are prepared to take on new digital duties and adjust to new academic roles.

The changing roles of faculty members have also led to worries about institutional preparedness, workforce development and sustainability of higher education systems. In the rapidly evolving digital intelligence landscape, universities need to make sure staff members have the skills and backing needed to meet new demands. This is especially important in low resource countries where the successful implementation of digital innovation may be constrained by resource limitations (Bozkurt et al., 2022). Therefore, it is important to get a sense of faculty attitudes and adjustments to evolving role expectations in order to design effective policies and capacity-building efforts.

Although digital transformation in higher education has been a focus of recent scholarly work, much of the literature has focused on either technology adoption or online learning and/or the use of ICT in the classroom among students and teachers (Bond et al., 2018; Zawacki-Richter et al., 2019). The changing role of the university faculty in the wider context of digital intelligence, especially in the Nigerian higher education context, has been less of consideration in comparative studies. Additionally, there is scarce empirical evidence on relationships between the adoption of digital intelligence tools, digital competence, transformation of the role of faculty, and adaptation to new roles. Few studies have been conducted to examine the role of demographic factors as they relate to faculty adaptation.

In this context, the present study explores how the role of the faculty members in the era of digital intelligence has changed and is being changed in Nigerian Universities, in particular. In particular, the study considers: Digital Intelligence tool adoption, levels of faculty digital competence, changing roles of faculty at the university, and adaptation to the changing roles. It also looks at the link between digital competence and the use of digital intelligence tools and the impact of demographic features on faculty adaptation. The study fills this gap and offers evidence that can be applied to the policy discussion, professional development programmes, and institutional strategies to improve faculty effectiveness in the digital age.

Research Objectives

The broad objective of this study is to examine how digital intelligence is transforming the roles, and competencies of university faculty in Nigerian universities. Specifically, the study seeks to:

i. assess the extent of digital intelligence tools adoption among university faculty in Nigerian universities.

ii. determine the level of digital competence of university faculty in Nigerian universities.

iii. identify the emerging roles of university faculty in the digital-intelligence era.

iv. assess the level of adaptation of university faculty to emerging roles in the digital-intelligence era.

v. examine the relationship between faculty digital competence and their adoption of digital intelligence tools.

vi. examine the influence of faculty demographic characteristics (age, academic rank, discipline, years of experience, and institution type) on their adaptation to emerging roles in the digital-intelligence era.

Research Questions

1. What is the extent of digital intelligence tools adoption among university faculty in Nigerian universities?

2. What is the level of digital competence of university faculty in Nigerian universities?

3. What are the emerging roles of university faculty in the digital-intelligence era?

4. What is the level of adaptation of university faculty to emerging roles and responsibilities in the digital-intelligence era?

Hypotheses

H_{01}: There is no significant relationship between faculty digital competence and their adoption of digital intelligence tools in Nigerian universities.

H_{02}: Faculty demographic characteristics (age, academic rank, discipline, years of experience, and institution type) do not significantly influence their adaptation to emerging roles in the digital-intelligence era.

Literature Review

Conceptual Review

Concept of Digital Intelligence

Digital intelligence has developed as a reaction to the growing complexity of the digital technologies and their inclusion in daily life, learning and work. Digital literacy is generally associated with the use of digital devices and technology, but digital intelligence goes beyond that and includes a range of technical, cognitive, social, and ethical skills needed to be effective in digitally mediated environments (Park, 2019). Digital intelligence is the set of social, emotional and cognitive skills that allow people to use digital technologies responsibly, critically and innovatively with ethical principles and digital well-being (Ng et al., 2021). The changing landscape of education due to digital transformation has created a need for digital intelligence as a core competency for the university faculty who want to be effective teachers, researchers and service providers to the institution.

Digital intelligence is the development of previous conceptions like computer literacy, information literacy, media literacy and ICT literacy. In the early stages of educational technology integration, emphasis was more on basic computer operation and information retrieval skills. In recent years, however, the demand for AI, machine learning, big data analytics and digital communication skills has grown for both teachers and students (Ng et al., 2021). As such, scholars have suggested that digital intelligence is a more holistic construct, as it encompasses the technical skills, critical thinking, moral reasoning, creativity, flexibility, and collaboration skills that are needed in the modern digital societies (Falloon 2020; UNESCO 2023).

Digital intelligence has a number of components. Digital literacy is a core component and consists of skills in locating, evaluating, creating and communicating information through digital technologies

(Spante et al., 2018). As teachers are expected to be knowledgeable about the strengths, weaknesses, and ethical concerns of AI applications in education, AI literacy has become a vital concern (Long & Magerko, 2020). Ethical use of technology is also an important aspect, where students are expected to exhibit responsible, responsible online behavior, respect intellectual property rights, and ensure the privacy of data and academic integrity (UNESCO, 2023). Adaptability is also an important consideration because in digital environments, technology is dynamic and changing often, requiring constant learning and professional development (Bond et al., 2018). In addition, collaboration skills help teachers participate in virtual learning communities and global knowledge networks, and they help them interpret and use education data for evidence-based decision making (Ifenthaler & Schumacher, 2023).

Digital intelligence has become much more relevant in the context of Higher Education in the last ten years. Digital platforms, learning analytics, AI tools and online collaboration systems have become more and more integral to the ways universities improve learning, teaching and research results (Crompton & Burke, 2023). Therefore, faculty members are expected to have digital intelligence competencies to develop creative learning experiences, to support students' engagement with learning, and to participate in the digital transformation efforts within the institution (Redecker, 2017). The advantages of digital intelligence also include lifelong education, interdisciplinary working and the future readiness of graduates, who will succeed in knowledge-based economies (Aoun, 2018). In this sense, digital intelligence is no longer a mere ability but a strategic competency that is the basis of innovative education and excellent academic performance in today's universities.

Digital Intelligence Tools in Higher Education

Digital intelligence tools are digital technologies, platforms and applications that are used for the intelligent processing, automation or data-driven functionalities for supporting (Zawacki-Richter et al., 2019) teaching, learning, assessment, research, communication and decision-making. They help to implement digitally enhanced education and enable teachers to carry out their academic duties in a technology-rich context.

One of the most popular digital intelligence systems in universities are Learning Management Systems (LMS), like Moodle, Blackboard, and Canvas. These platforms offer integrated course management, content delivery, communication, assessment and student progress monitoring (Almaiah et al., 2020). This has gained significance in the era of the COVID-19 pandemic when universities around the world moved to online and blended teaching and learning (Crawford et al., 2020). Their ongoing use demonstrates the increasing awareness of the use of technology mediated learning as a viable permanent method of learning in higher education.

AI tools also have become a significant feature in universities. The tools used for creating content include ChatGPT, Grammarly, Turnitin AI detection, intelligent tutoring systems, adaptive learning, and student feedback systems (Kasneci et al., 2023). At the same time, these technologies present opportunities for improving teaching practices and student learning, and raise some ethical and pedagogical questions about their use (UNESCO, 2023).

The synchronous teaching of children, virtual meetings, academic conferences, and international collaborations are now completely reliant on virtual conferencing platforms like Zoom, Microsoft Teams, and Google Meet (Rapanta et al., 2020). Likewise, data analysis tools can help faculty and institutions understand the patterns of student performance, as well as provide evidence to guide educational interventions. (Ifenthaler & Schumacher, 2023) Research collaboration platforms such as ResearchGate, Mendeley, Zotero and Google Scholar also enable geographic research networking, sharing and collaborative research (Jordan, 2019).

At the international level, the adoption of digital intelligence tools has, in general, grown considerably over the past few years, being one of the topics universities are interested in in order to support their digital transformation agendas, aiming to enhance educational quality and accessibility. (Bond et al., 2021) The use of digital platforms in Nigeria has gained momentum in the fields of teaching, research, and administration, with some universities being more advanced in their adoption than others, depending on their infrastructure, funding, and technological capabilities (Aina et al., 2023; Okoye et al., 2024). Some universities have integrated the advanced digital technologies into their operations well, but others continue to experience difficulties related to poor internet connection, insufficient technological infrastructure and lack of professional development opportunities for their faculty members.

It is important to note that institutional factors have a significant impact on digital intelligence tools uptake. Researchers have found that leadership support, organisational culture, technological infrastructure availability, training programmes availability, funding and institutional policies are the major factors affecting the successful adoption of technology in higher education (Scherer et al., 2021; Almaiah et al., 2020). As indicated by the Technology Acceptance Model (TAM) (Davis, 1989), faculty perceptions of usefulness and ease of use of digital technologies also have an impact on decisions for adoption. Therefore, universities aiming to improve their adoption of digital intelligence tools need to foster a culture of innovation, lifelong learning, and successful technology use within their communities.

Digital Competence of University Faculty

The digital competence is the knowledge, skills, attitudes, and values that are needed for using digital technologies effectively, critically, creatively, and responsibly in professional and personal settings (Redecker, 2017). In the context of higher education, digital competence is a key competence that allows teachers to use technology in teaching, learning, evaluation, communication and professional development. The digital competence of teachers has become an important factor in the quality of education and the innovation of university education, and it is also increasingly becoming a factor that affects the success of universities adopting digital intelligence tools.

All of the following components fall under faculty digital competence. Technical competence is the skill to effectively use digital devices, applications of software, platforms and emerging technologies (Falloon, 2020). Pedagogical competence is the ability to use digital technologies in the design of teaching strategies and pedagogy that supports students' learning outcomes (Tondeur et al., 2020). Information literacy is the ability to find, assess, manage, and effectively use digital information for

academic purposes (Spante et al., 2018). Communication competence helps teachers communicate, interact and collaborate via digital platforms and online communities with students and colleagues (Ferrari, 2018).

Another aspect of digital competence is cybersecurity awareness, which is also a point of concern in the context of the continuous expansion of privacy issues, cyber threats and ethical issues related to technology use (Scherer et al., 2021). Also, the competence in AI integration has become a modern need, which means that teachers need to be aware of, appraise, and use AI applications in ways that are suitable for teaching and research (Ng et al., 2021; Kasneci et al., 2023). These skill sets allow teachers to adapt to the ever-evolving digital and data-centric classroom.

Digital competence is of high importance for university teaching and research. Faculty who are digitally competent are more likely to use innovative teaching methods, engage students, utilize learning analytics, collaborate with faculty from around the world, and be involved in digital transformation projects within the institution (Cabero-Almenara et al., 2021; Scherer et al., 2021). Furthermore, digital competence increases teachers' capacity to address technological shifts and equip learners for jobs that are increasingly digital.

The need for digital competence among faculty members is still present, but there are still barriers in achieving digital competence, especially in developing countries. The development of competence is frequently constrained by limited access to technological infrastructure, lack of training opportunities, financial constraints, and unequal institutional support (Bozkurt et al., 2022; Aina et al., 2023). The differences in professional development and technological resources has also resulted in differences in faculty digital competence between institutions and disciplines in Nigeria (Okoye et al., 2024). If the issue of these challenges is not addressed, it becomes extremely difficult to achieve effective technology integration and to meet the growing expectations of the role of university professors in the digital intelligence era.

Theoretical Framework

Technology Acceptance Model (TAM)

One of the most important frameworks to explain the individual acceptance and use of information technologies is the Technology Acceptance Model (TAM) proposed by Davis (1989). The model suggests that two beliefs, perceived usefulness and perceived ease of use, are the major factors influencing technology adoption. Perceived usefulness is the extent to which an individual thinks that the use of a specific technology will enhance his/her job performance and perceived ease of use is the degree to which an individual thinks that the technology can be used with less effort (Davis, 1989). These attitudes are influenced by these beliefs, and then the behavioral intent and actual technology use of the users.

TAM states that the likelihood of the users adopting a technology increases if they see the technology as useful and easy to use (Venkatesh and Davis, 2000). Positive attitudes towards technology boost the behavioral intentions which results in higher usage of technological systems in professional setting (Scherer et al., 2019). TAM has been extensively used in the study of educational technology adoption over the years to describe the adoption of e-learning systems, LMS, AI applications and others (Almaiah et al., 2020; Bond et al., 2021; Chatterjee & Bhattacharjee, 2020; Granić & Marangunić, 2019).

The importance of TAM for the current study is that it can provide the explanation for university faculty's adoption of digital intelligence tools. When faculty believe that the use of the tools is helpful and easy to use, their engagement with learning management systems, AI tools, virtual conferencing, data analytics, and research collaboration technologies increases (Kasneci et al., 2023; Ng et al., 2021). Moreover, the digital competence can affect the perceived usefulness and perceived ease of use, which in turn can affect adoption behaviour (Falloon, 2020). Thus, TAM serves as a direct support to Objective 1, which considers the adoption of digital intelligence tools, Objective 2 which examines the faculty's digital competence and Objective 5 which investigates the relationship between digital competence and the adoption of digital intelligence tools.

Role Theory

Biddle (1986) developed the Role Theory which is a useful perspective of human behaviour in the social and organisational world. The theory assumes that people are in different social roles, each with a set of social expectations, norms, responsibilities and behaviors. These expectations are what people are supposed to do in institutions and professions (Biddle, 1986).

The four key components of the role theory are role expectations, role conflict, role adaptation, and role performance. Role expectations are the behaviours that are believed to be appropriate for a specific role. Role conflict is when the requirements of two or more roles are incongruent, making it hard for someone to perform both roles. Role adaptation is the modification of behaviors, skills, and attitudes in response to the changing expectations of the role, whereas role performance is the execution of assigned behaviors, skills, and attitudes (Kahn et al., 1964; Turner, 2001).

The faculty in a university typically have been expected to undertake the three missions of universities—teaching, research, and community service. Yet, as digital transformation has thrown new expectations at faculty members, they are now expected to be learning facilitators, instructional designers, digital mentors, data-informed educators, online assessors, and ethical guides for AI use (Crompton & Burke, 2023; Selwyn, 2019). These shifting expectations can generate role conflicts and at the same time call for adaptation and professional development. With this in mind, the relevance of Role Theory to the following objectives are highlighted: Objective 3: Emerging faculty roles and responsibilities; Objective 4: Faculty adaptation to these roles; and Objective 6: The influence of demographic characteristics on faculty role adaptation.

Empirical Review

Empirical studies have repeatedly shown that more and more faculty members in universities are using digital technologies, especially since the COVID-19 pandemic. Almaiah et al. (2020) found that the adoption of e-learning systems by faculty members was quite broad during the pandemic, but technological infrastructure and institutional support greatly affected the use of these systems. Likewise, Bond et al. (2021) found that the use of digital learning platforms in higher institutions is increasing, and universities are increasingly using Learning Management Systems (LMS), virtual conferencing and online assessment technologies. Zawacki-Richter et al. (2019) noted the growing application of artificial intelligence in higher education, especially when it comes to personalised learning, evaluating, and supporting students. Chatterjee and Bhattacharjee (2020) showed that the factors of perceived usefulness and institutional readiness had a significant impact on the adoption of AI by educators. Aina et al., (2023) indicated that the moderate use of digital teaching technologies by lecturers in Nigeria is a result of infrastructure challenges and lack of training. Likewise, Okoye et al. (2024) reported funding limitations, access to unreliable Internet and lack of institutional support as significant hindrances in the adoption of digital technology in the universities of developing countries.

The research literature has addressed the digital competence of the university faculty on several empirical studies, with a view to their implications for learning effectiveness. The digital competence of lecturers was found to be moderate by Cabero-Almenara et al (2021), indicating their good skills in communication and information management but limited ones in advanced digital content creation. In addition to technical competence, faculty competence was also reported by Falloon (2020) as pedagogical and ethical aspects of technology use. Scherer et al. (2021) noted a difference in Digital competency amongst age groups and disciplinary backgrounds, with younger faculty members generally having a higher level of technological skills. The need for lifelong learning to foster digital competence of teachers was emphasized by Tondeur et al. (2020). Aina et al. (2023) found significant variations in the level of Digital Competencies of university lecturers in Nigerian study, primarily because of the diversity in training opportunities and institutional resources. Likewise, Okoye et al. (2024) identified that although most academics had some level of digital competence, there was still relatively low proficiency in the use of emerging technologies like AI and learning analytics. The common theme from these studies is that there are continuing gaps in skills, and there is a need for targeted capacity building programs.

It is found that the literature has witnessed an incremental shift in faculty roles from being the transmitters of knowledge to facilitators of learning and digital innovators. As artificial intelligence becomes more present in higher education, Crompton and Burke (2023) noted that the role of the faculty has also shifted, and educators must take on the role of a learning facilitator, mentor and technology-enhanced learning environment designer. Likewise, Selwyn (2019) said, digital transformation has transformed the role of academics, from being service providers to supporting students in their learning and critical engagement with digital technologies. In the pandemic period, both the faculty and the instructors took over an increasing number of duties related to online instructional design, digital communication and learner support, as found by Rapanta et al. (2020). Bond et al., (2021) found that

through the use of technology, teachers have shifted to a collaborative and facilitative teaching model. Kasneci et al. (2023) also pointed out that with the rise of generative artificial intelligence tools, faculty members should educate students on how to use artificial intelligence technologies in an ethical and effective manner. Such a conclusion is indicated by the new findings that suggest that the academic position today is more than just a teaching and research post.

The phenomenon of faculty adaptation to new roles in the changing world of work has received a growing body of scholarly interest. Bozkurt et al. (2022) identified the key factors that affected the reactions of the educators: Resilience, adaptability and willingness to learn. Crawford et al. (2020) found that faculty experienced a range of preparedness for online teaching, which was related to previous experience with technology and institutional support. Scherer et al. (2021) found that having a positive attitude towards technology was a significant factor in better adaptation to digital teaching environments for faculty. Likewise, the importance of professional development programmes in adaptation to new pedagogical expectations was highlighted by Rapanta et al. (2020). In the context of developing countries, Okoye et al. (2024) noted that poor infrastructure, policy gaps and lack of training opportunities were common limitations on adaptation. The results of this study indicate that individual and institutional factors are important in adaptation.

There is significant empirical evidence showing a correlation between digital competency and technology use among teachers. A meta-analysis study conducted by Scherer et al. (2019) using SEM showed that digital competence significantly predicted the teachers' use of educational technologies. Likewise, Cabero-Almenara et al. (2021) found that digital skills of lecturers were conducive to using technology in their teaching. Falloon (2020) discovered that competence boosted the confidence of educators and decreased resistance to technology innovation. Furthermore, in their study, Chatterjee and Bhattacharjee (2020) noted that technological knowledge had a positive impact on the adoption intentions of educators of AI. A related study by Ng et al., (2021), found that AI literacy had a significant impact on the acceptance and successful use of new digital technologies. Collectively, these studies

A number of studies have investigated the impact of demographic characteristics on the adaptation of faculty to technological change. In general, younger faculty members indicated they had greater digital competence and more technology use than older faculty members (Scherer et al., 2021). The same technology readiness and willingness to use innovative teaching methods were found by Tondeur et al. (2020) for the age difference. Cabero-Almenara et al. (2021) found that there were differences in digital competence among academic subjects with higher competence levels in technology-related subjects. The academic rank and experience significantly affected the use of digital technologies among lecturers in Nigerian universities as found by Aina et al. (2023). Additionally, Okoye et al., (2024) noted that faculty members from private universities usually showed higher technological adaptation levels than many of the public universities as a result of increased access to digital resources and training opportunities.

The results show that demographic factors still play a significant role in shaping the adaptation to new responsibilities in the digital era.

The empirical literature, as a whole, point to a greater use of digital technologies, the growing awareness of digital competence as a strategic faculty competence and significant changes in academic roles. The combination of digital competence, demographic characteristics, digital intelligence tool adoption and adaptation to changing faculty roles in Nigerian universities, however, have not been well documented, which justifies the present study.

Methodology

Research Design

This study was descriptive survey research design. The descriptive survey design was deemed appropriate as it allowed the researcher to gain information from a large population on existing conditions, attitudes, perceptions, behaviours and practices without manipulating any variables. The design is especially appropriate for studies that attempt to describe aspects of a population and the relationships between different variables as they naturally occur. The design enabled the researcher to gather information on the adoption of digital intelligence tools, digital competence, changing roles and responsibility, and changes to new academic positions of faculty members in Nigerian Universities in the context of this study. In addition, the descriptive survey design was considered appropriate as it aimed at generating empirical evidence from a large population spread geographically with the university faculty comprising the six geo-political zones of Nigeria. The design also enables the application of quantitative data analysis methods including descriptive statistics, correlation analysis and multiple regression analysis that are required to answer the research questions and test the hypotheses.

Population of the Study

The population of this study were all faculty members in accredited Universities in Nigeria. The Faculty members are the backbone of the academic profession, who performs the functions of instruction, research, and service in Universities. The population comprised academic staff of six geo-political zones of Nigeria (federal, state and private) universities. The population was selected because the faculty members are engaged directly in the adoption and use of digital intelligence tools and have new roles and responsibilities as part of digital transformation in higher education.

Sample and Sampling Technique

For the study, a sample of 900 faculty members was chosen. The sampling was of the 18 universities across the six geo-political zones of Nigeria. In particular, three universities were chosen from each geo-political zone making a total of eighteen universities. A sample of 50 faculty members were selected from each of the selected universities, which resulted in 900 respondents. Purposive sampling technique was used to select the universities and respondents. Purposive sampling was deemed to be the best sampling technique for the study, since the study needed participants with sufficient experience and exposure to digital technologies and academic responsibilities in university settings. The technique helped the researcher to intentionally identify universities that have digital learning infrastructures in

place as well as faculty members who are actively involved in teaching, research, and technological-mediated academic activities.

The use of purposive sampling also ensured adequate representation of the six geo-political zones and by extension the inclusion of diverse institutional context such as federal, state and private universities. This facilitated the likelihood of getting good and meaningful data that could answer study objectives. Moreover, the number of respondents of 900 was regarded as adequate for the results obtained to be considered statistically reliable and representative of the entire Nigerian universities.

Research Instrument

Structured questionnaire created by the researchers and labelled the “The Evolving Role of University Faculty in the Age of Digital Intelligence Questionnaire (ERUFDIQ)” was used to collect the data. The questionnaire was divided into two sections: one for the children and the other for the mother. The information obtained from section A covered information on the demographic characteristics of the respondents such as their gender, age, academic rank, discipline, years of experience and type of university. The items in Section B were related to the main constructs of the study, namely digital intelligence tool adoption, digital competence, emerging roles and responsibilities of university faculty, and adaptation to emerging roles and responsibilities in the digital-intelligence era. The questionnaire was comprised of 40 substantive items across the four constructs, 10 items for each construct. The five-point Likert type scale were used in gathering the responses: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1).

Validity of the Instrument

Face validity, content validity, and construct validity were conducted to validate the instrument. The questionnaire was examined by experts in Educational Technology, Measurement and Evaluation and Higher Education Studies to check the face validity of the items of the questionnaire with regard to the clarity, appropriateness, readability and relevance. They observed and recommended changes in the instrument that were included in the final version. To assess the content validity, an expert evaluation was performed to ascertain the degree of content representation of the items within the domains of the constructs being analysed. Experts evaluated the content relevance with the study objectives and constructs. A scale-level content validity index (CVI) was found to be 0.92 which represents excellent content validity.

A pilot study was conducted and exploratory factor analysis was used to establish construct validity. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value was 0.903, which is greater than the recommended value of 0.60. Furthermore, Bartlett's Test of Sphericity was significant statistically (χ^2 = 8,756.431, $p < .001$), which meant that the data were appropriate for factor analysis. The factor loadings for the items retained were from 0.68 to 0.89, which shows acceptable construct validity.

Reliability of the Instrument

To determine the reliability of the instrument, a pilot study was done among the faculty members who shared similar characteristics with the respondents, but were not part of the main study. The information collected from the pilot study was analysed using Cronbach's alpha reliability coefficient to assess the internal consistency of the instrument. Overall Cronbach's alpha coefficient was .951, which is extremely high. The acceptable reliability for the research is 0.70 and above, and excellent reliability is 0.90 and above. Thus, the coefficient of 0.951 affirmed the reliability and appropriateness of the instrument to collect data.

Method of Data Analysis

Both descriptive and inferential statistics were used to analyse the data collected for the study. Mean and standard deviation were used to answer the research questions. Inferential statistical methods were used to test the hypotheses at 0.05 level of significance. For this purpose, Pearson Product-Moment Correlation Analysis was selected for testing the relationship between the concepts of faculty digital competence and digital intelligence tool adoption. Additionally, Multiple Regression Analysis (MRA) was used to identify the factors influencing the adaptation to emerging roles and responsibilities in the digital-intelligence era of the faculty demographic characteristics. The software used for all the analysis was the Statistical Package for the Social Sciences (SPSS).

Ethical Considerations

Before data collection, permission to carry out this research was obtained from the institutional authorities of the participating universities in the study. All respondents were asked to provide informed consent and the study was conducted voluntarily. The participants were assured their confidentiality and anonymity, and no personal information was gathered in the questionnaire. They also were told that they could drop out of the study at any time without penalty. The data gathered were only utilized for academic objectives and were secured to stop unauthorized access. The study adhered to the ethical principles that have been established for research with human participants in a higher education setting.

Findings

Answers to Research Questions

Research Question 1: What is the extent of digital intelligence tools adoption among university faculty in Nigerian universities?

Table 1: Mean and standard deviation of digital intelligence tools adoption

S/N	Items	Mean	Std. D.	Remarks
1	Use of LMS (Moodle/Canvas/Blackboard)	3.92	0.81	Agreed
2	Use of Zoom/Google Meet/Teams for teaching	4.10	0.74	Agreed
3	Use of AI tools for academic tasks	3.48	0.95	Agreed
4	Use of Turnitin and AI detection tools	3.67	0.88	Agreed
5	Use of digital libraries and databases	4.12	0.69	Agreed
6	Use of online assessment tools	3.75	0.84	Agreed
7	Use of research collaboration platforms	3.41	0.97	Agreed
8	Use of data analytics tools in teaching	3.22	1.01	Agreed
9	Use of cloud-based academic tools	3.58	0.90	Agreed
10	Integration of multiple digital tools in teaching	3.46	0.93	Agreed
	Grand Mean	**3.67**		**High**

Decision rule: **Mean ≥ 3.00 = High; Mean < 3.00 = Low**

Table 1 indicated that the digital intelligence tools adoption is high among the faculty members of Nigerian universities, with the grand mean of 3.67. The mean scores for all items exceed the benchmark of 3.00, suggesting that these LMS platforms, virtual conferencing tools, digital libraries, and online assessment systems are being widely used. While overall rates of adoption were high, certain tools like data analytics and research collaboration platforms had relatively lower means, indicating a certain integration but still developing of advanced digital tools in academic practice.

Research Question 2: What is the level of digital competence of university faculty in Nigerian universities?

Table 2: Mean and standard deviation of digital competence

S/N	Items	Mean	Std. D.	Remarks
1	Ability to use basic computer applications	4.15	0.72	High
2	Ability to design digital learning content	3.42	0.96	High
3	Ability to use LMS effectively	3.88	0.80	High
4	Ability to use AI tools in teaching	3.21	1.02	Moderate
5	Ability to manage online classrooms	3.76	0.85	High
6	Information literacy skills	4.05	0.70	High
7	Communication via digital platforms	4.10	0.68	High
8	Cybersecurity awareness	3.33	0.98	Moderate
9	Data interpretation skills	3.28	0.99	Moderate
10	Continuous digital learning willingness	4.18	0.65	High
	Grand Mean	**3.73**		**High**

Decision rule: **Mean score of 1.00 – 2.49 = Low; Mean score of 2.50 – 3.49 = Moderate; Mean score of 3.50 – 5.00 = High**

The result indicated that the digital competence of university teachers is high, the grand mean for these teachers is 3.73 (see Table 2). Faculty members are highly proficient in communication tools, basic computer skills and information literacy. Moderate competences were observed, however, in AI integration, cybersecurity awareness and data interpretation skills. This means that the basic digital skills are strong but there are shortcomings in the higher-level digital intelligence skills, especially in the context of artificial intelligence and data-informed academic practice.

Research Question 3: What are the emerging roles of university faculty in the digital-intelligence era?

Table 3: Mean and standard deviation of emerging faculty roles

S/N	Items	Mean	Std. D.	Remarks
1	Acting as learning facilitators	4.25	0.66	Agreed
2	Serving as online instructors	4.18	0.71	Agreed
3	Acting as instructional designers	3.62	0.91	Agreed
4	Serving as digital mentors to students	3.95	0.78	Agreed
5	Using data to guide teaching decisions	3.41	0.97	Agreed
6	Conducting research in digital environments	4.08	0.69	Agreed
7	Guiding ethical use of AI tools	3.67	0.86	Agreed
8	Managing virtual classrooms	4.02	0.74	Agreed
9	Participating in global research networks	3.38	0.99	Agreed
10	Supporting blended learning systems	4.11	0.72	Agreed

Decision rule: **Mean ≥ 3.00 = Agreed; Mean < 3.00 = Disagreed**

The mean scores of faculty members are grand means of 3.86 as shown in Table 3, which suggest that faculty members have accepted new roles in the digital-intelligence era. The majority of the respondents strongly agree that they are now learning facilitators, online instructors and digital mentors. They also engage in instructional design, virtual classroom management and ethical counselling on AI utilization. But participation in international research networks and high-level data-informed decision making is comparatively low, indicating a slow but uneven process of transformation of the role of institutions.

Research Question 4: What is the level of adaptation of university faculty to emerging roles in the digital-intelligence era?

Table 4: Mean and standard deviation of faculty adaptation

S/N	Items	Mean	Std. D.	Remarks
1	Willingness to adopt new teaching methods	4.20	0.70	High
2	Flexibility in using digital tools	3.95	0.79	High
3	Readiness for AI-driven teaching	3.40	0.98	Moderate
4	Engagement in continuous learning	4.12	0.68	High
5	Ability to cope with role changes	3.78	0.84	High
6	Participation in ICT training	3.36	0.95	Moderate
7	Innovation in teaching practices	3.88	0.80	High
8	Acceptance of student-centred learning	4.10	0.73	High
9	Adaptation to online assessment systems	3.91	0.77	High
10	Overall readiness for digital transformation	3.84	0.81	High
	Grand Mean	**3.86**		**High**

Decision rule: **Mean score of 1.00 – 2.49 = Low; Mean score of 2.50 – 3.49 = Moderate; Mean score of 3.50 – 5.00 = High**

The grand mean of the responses to the level of faculty adaptation to emerging roles was 3.86, as indicated in Table 4, implying that there is a high level of faculty adaptation to emerging roles. There is good commitment among faculty to the use of new pedagogical approaches, capacity building and embracing student-centred pedagogies. Adopting online assessment and digital teaching is also high. But preparedness for AI-enhanced teaching and participation in organized ICT training are not that high. This indicates good overall adaptation, but with advanced digital intelligence readiness gaps.

Hypotheses Testing

H_{01}: There is no significant relationship between faculty digital competence and their adoption of digital intelligence tools in Nigerian universities.

Table 5: Correlation between digital competence and digital tool adoption

Variables	N	Mean	Std. D.	r-value	Sig. (2-tailed)	Decision
Digital competence	900	3.73	0.64			
				0.782**	0.000	Significant
Digital tool adoption	900	3.67	0.71			

****Correlation is significant at 0.05 level (2-tailed)**

Table 5 presents the Pearson Product-Moment Correlation which reveals that there is high positive correlation between the faculty digital competence and their use of digital intelligence tools in Nigerian universities ($r = 0.782$, $p = 0.000 < 0.05$). This suggests that the higher the digital competence of faculty, the higher the level of utilisation of digital intelligence tools. The p-value (0.000) is less than the significance level (0.05) so it is a statistically significant result. The null hypothesis (H_{01}) that there is no significant relationship between digital competence of faculty members and digital intelligence tools is therefore rejected.

H_{02}: Faculty demographic characteristics (academic rank, discipline, years of experience, and institution type) do not significantly influence their adaptation to emerging roles in the digital-intelligence era.

Table 6: Multiple regression analysis showing influence of faculty demographic characteristics (academic rank, discipline, years of experience, and institution type) on their adaptation to emerging roles in the digital-intelligence era

R = 0.741

R Square = 0.549

Adjusted R Square = 0.547

Std. Error = 0.412

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	98.432	5	19.686	116.52	0.000
Residual	80.742	894	0.090		
Total	179.174	899			

a. Predictors: (Constant), Faculty demographic characteristics (age, academic rank, discipline, years of experience, and institution type)

b. Dependent Variable: Adaptation to emerging roles in the digital-intelligence era

Coefficients

Variables	**Unstandardised Coefficient (B)**	**Std. Error**	**Standardised Beta (β)**	**t**	**Sig.**
(Constant)	1.214	0.118		10.29	0.000
Age	-0.132	0.031	-0.168	-4.26	0.000
Academic rank	0.245	0.042	0.231	5.83	0.000
Discipline	0.187	0.038	0.201	4.92	0.000
Years of experience	-0.154	0.036	-0.179	-4.28	0.000
Institution type	0.298	0.045	0.276	6.62	0.000

Multiple correlation coefficient (R) of the model was 0.741 from Table 6, which means there was a strong relationship between the faculty demographic characteristics and adaptation to emerging roles. The R^2 value of 0.549 suggests that 54.9% of the variance in faculty adaptation is explained by demographic variables (age, rank, discipline, years of experience, and institution type). Moreover, the ANOVA result shows that the regression model is statistically significant ($F = 116.52$, $p = 0.000 < 0.05$). This suggests that certain factors in the demographics predict faculty adaptation to new roles. Lastly, all demographic variables, as revealed by the coefficients table, are significant at $p < 0.05$ level of significance in predicting faculty adaptation to emerging roles and responsibilities in the digital-intelligence era. The negative β values for age (-0.168) and years of experience (-0.179) suggest that the more age and

experience faculty members are, the less likely they will be to adapt. Academic rank (β = 0.231), the discipline (β = 0.201) and the type of institution (β = 0.276) are however, shown to be positive factors in adaptation, with type of institution being the strongest. The findings imply that there is a strong relationship between personal and institutional factors influencing faculty adaptation behaviour in Nigerian universities.

Discussion of Findings

The study revealed that there is a high level of Digital intelligence tools adoption by the faculty in Nigerian Universities. It is consistent with the global and Nigerian evidence that revealed that use of LMS, AI and virtual tools increased post-COVID-19 (Almaiah et al., 2020; Bond et al., 2021). To further support findings, lecturers are increasingly using AI tools for teaching and research (Chatterjee & Bhattacharjee, 2020; Kasneci et al, 2023). However, it differs from research that documents that barrier to adoption include infrastructure and policy factors in developing nations (Okoye et al., 2024; Zawacki-Richter et al., 2019). This is the current finding that indicates the institutional preparedness is improving the level of adoption.

The research found that overall, faculty members are highly competent in digital skills, but they still have some areas of need, such as AI, Cybersecurity and Data Analytics. This agrees with studies reporting moderate competence levels with persistent skill gaps (Cabero-Almenara et al., 2021; Scherer et al., 2021). It also backs Falloon (2020) and Ng et al. (2021) who found that teachers lacked in their digital and AI literacy, highlighting the need for gaps to be filled. But it differs from the results obtained by Aina et al., (2023) and Okoye et al., (2024) in the universities of developing countries where lower competency level was reported. This increased competence can be attributed to increased training and digital exposure due to the pandemic.

The study reveals that teaching functions have undergone a profound transformation, with a new focus on facilitation, mentoring, and digital teaching. This aligns with the findings of Crompton and Burke (2023) who found a transformation from a teacher-centred to a learner-centred role, Selwyn (2019) who found a teacher-centred to digitally mediated role and Rapanta et al. (2020) who found a transformation from a teacher-centred to a learner-centred role and digitally mediated role. It also resonates with Kasneci et al. (2023), who pointed out the role expansion that can be made possible by AI in education. In contrast, there is less global collaboration and decision making based on data in the limited scope of the sample, whereas there is more evidence of institutional integration in the more advanced systems (Bond et al., 2021). This implies that there is a partial role transformation in Nigerian Universities.

The results indicate a high level of faculty adaptation to new digital roles and moderate levels of readiness for AI and participation in AI training. This is consistent with other studies by Bozkurt et al. (2022) and Crawford et al. (2020) which showed greater adaptability both during and after COVID-19 disruptions. It also aligns with the study by Scherer et al., (2021) which confirmed that positive attitudes positively influence adaptation. It differs from Okoye et al. (2024) who found low adaptation, because of

the lack of infrastructure in developing countries. This indicates a greater level of resilience; however, less than optimal readiness to integrate advanced digital intelligence.

The positive correlation between digital competence and tool use is very similar to the results of Scherer et al. (2019) and Cabero-Almenara et al. (2021), which reported competence as a crucial variable to evaluate technology use. Also it reinforces the findings of Ng et al. (2021) and Falloon (2020) that AI literacy and digital expertise are important factors influencing usage behaviour. Likewise, Chatterjee and Bhattacharjee (2020) and Awofala et al. (2024) found competence-based AI adoption. This strong relationship, however, is better than some of the moderate associations reported in previous studies with the developing countries, showing a greater capacity in the Nigerian Universities.

The results of the impact of demographic factors on adaptation are in line with the results of Scherer et al. (2021) and Tondeur et al. (2020), who found the age, experience, and discipline as the significant factors predicting technology adaptations. It also corroborates the findings of Aina et al. (2023) and Cabero-Almenara et al. (2021) who revealed differences between academic ranks and institutional types. Likewise, Okoye et al. (2024) pointed out structural and demographic disparities surrounding digital transformation. It does differ from recent research indicating a narrowing of demographic differences as a result of extensive exposure to AI (Kasneci et al., 2023), however. The present study reinforces that there is still need to consider demographic disparities in Nigerian Universities.

Implications to Theory, Practice and Policy

This study builds on the Technology Acceptance Model and finds that digital competence greatly enhances faculty's use of digital intelligence tools. In the practical aspect, it emphasizes the importance of ongoing faculty professional development on AI, LMS, and data-informed instruction. From a policy perspective, Nigerian universities need to focus on investment in digital infrastructure, institutional training programs, and ICT support systems. The results offer foundations for the integration of transformation in higher education with the global digital intelligence in the context of teaching and research.

Recommendations

Faculty members should have continuous professional development programmes on AI literacy, digital pedagogy and data analytics at universities. The role of the institutions' leaders is to improve ICT infrastructure, such as the stable Internet connection, LMS functioning and working. Fund government and regulatory bodies digital transformation efforts in public universities. Academic staff should be encouraged to participate in various collaborative digital research networks as well as novel teaching methods. Digital competence should also be taken into account as a key performance indicator in recruitment and promotion policies. The measures will facilitate adaptation to the requirements for digital intelligence in higher education in an effective way.

Acknowledgement of Limitations

The study is limited because of the use of self-reported questionnaire data that could have response bias. The cross-section design does not allow for causal inferences of relationship. Also, while the sample is geographically representative, some universities might not represent all the variations observed in the Nigerian higher education system.

Conclusion

In this study, the changing role of university teachers in the era of digital intelligence in Nigerian universities was studied. Results showed high use of digital tools, high digital competence, and high role transformation towards facilitation and digital pedagogy. Overall, faculty adaptation was positive, but there was a lack of advanced skills in AI. Digital competence had a significant effect on technology uptake, and demographic characteristics on adaptation to new roles. In conclusion, the researchers found Nigerian universities to be in the process of a significant digital transformation but further investment in training, infrastructure, and policy development is needed to better prepare faculty to meet the needs of digital intelligence in higher education.

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