Digital Pedagogical Approach for Effective Teaching and Learning Process in Tertiary Education System in Nigeria

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Abstract
Education system is continually witnessing pedagogical transformation in recent time. This paper thus delves into some concepts relating to effective adaptation of digital tools in teaching-learning process in the ever-evolving landscape of tertiary education in Nigeria. It posits that digital pedagogical skills are characterized by the ability to use and learn through ICTs in an academic environment and highlights key ways in which digital tools enhance pedagogical practices in tertiary education. Obstacles to effective implementation of digital tools in educational institutions such as inadequate funding, poor curriculum development, rapid pace of technological change, reluctance to change, insufficient professional development opportunities, among others, were identified. It concludes that effective application of digital tools in teaching has the capacity to eliminate some barriers that lead to poor achievement and ineffective teaching-learning process. Adequate funding of tertiary institutions and investment in the latest technological tools are thus recommended, among others, to facilitate effective digital teaching-learning process in tertiary institutions in Nigeria.

Keywords : Teaching, digital pedagogy, learning process, tertiary, education.

Introduction

The educational framework has changed from the old-fashioned chalk and dialogue teaching strategies to the digitalization of educational methods through specialized digital tools. Such a change not only expands the capacities of educators, but also expands the database of students which make them to become competitive in the international stage. The current era of the 21st century is the data and innovation era. All over the world, information in all ranges is making tremendous advances. Information and innovation are now being utilized within the field

of education to create effective and interesting instruction and effective preparation for both students and teachers (Muhammad et al, 2021). In today's situation, educators who use innovation in teaching and learning play a vital role in terms of digitalization in education. Technology has improved learning, making teaching and learning more curious and interactive.

The system of education is continually witnessing pedagogical transformation in the last decades. These are manifesting from the use of emerging blended approaches to teaching and learning, the use of technology in physical classroom, flipped classroom experience and the use of various e-learning platforms The use of web-pages, open-access learning and currently the application of different artificial intelligence tools such as Chabots, ChatGpt, Duolingo, Dream Box, ALEKS, Knewton and other artificial intelligence (AI) sophisticated technological system designed to perform human intelligence tasks are transforming educational pedagogy (Adeosun, 2020). Pedagogy encompasses teaching styles, theories, assessment, and feedback. It is adopted by educators and shaped by various factors, including the social system, content of information, and the learning environment. The pedagogy of teaching is expressed through the educator's delivery style, training preferences, experience, and contextual choices when planning and delivering a lesson. Presently, the educational landscape has witnessed a transformative shift with the overwhelming integration of information and communication technology (ICT) in teaching methodologies.

The use of technology in education is considered to be a general modern teaching method that coordinates innovation into educational modules. The continuous support of the internet and the utilization of network-linked devices have revolutionized education, making digital pedagogy an essential aspect across various educational stages. Contemporary modalities for virtual training utilize ICT to provide electronic materials, e-books, videos, and e-transcripts, facilitating flexible and adaptable learning. These methods have proven advantageous due to their adaptability and remote utilization, enabling ubiquitous learning without restrictions on place and time. The development of AI has had a profound impact on education and teaching pedagogy, changing the teaching methods of teachers and the learning methods of students. AI digital tools lift up pedagogical practices by enabling personalized learning, automating routine administrative tasks to free up educator time and providing data driven insight to inform instructional strategies. Its potentials in education includes, but not limited to, personalized

learning, intelligent tutoring and automated assessment.

Digital Literacy

Digital literacy is the ability to use information and communication technologies to find, evaluate, create, and communicate information, are a cognitive skill in addition to a technical skill. The most important thing is that people develop digital literacy because it is the primary means through which all citizens can gain access to society and the job market. It is the essential technology that allows the other competence to be successful in the 21st century. Furthermore, digital literacy is not a fixed set of skills; it is a developing, versatile competence that varies according to the rapidly changing technological environment (Nieves et al., 2022).

Digital literacy entails having the skills to communicate, manage information, and solve problems using technology. Nowadays many people use digital technologies in everyday life as it goes beyond basic computer use, needing the ability to search and evaluate information responsibly online. Educators need these skills to prepare students for today's job market. Having the core competencies in using technology is crucial in this fast-changing world. Employers want workers with technological skills and flexibility using many digital tools because it entails not only the use of digital tools for instructional use but also the training of these tools into real-world applications.

Muhammad et al (2024) assert that digital literacy is an expansive idea that has become essential for the acquisition of 21st-century skills. It represents a wide set of competencies, which allow the user to effectively manage technology in both environmental and professional contexts. For educators, digital literacy is crucial for better teaching pedagogy as well as preparing students for the much-needed work skills. It contains functional elements and critical and social ones, thus, it includes basic technical skills and critical analysis of digital content, as well as an understanding of social impacts.

Digital Pedagogy Conceptualised

Pedagogy is the act of teaching, and the rationale that supports the actions that teachers take. It is what a teacher needs to know and the range of skills that a teacher needs to use in order to make effective teaching decisions. Pedagogy is essentially a critical thinking exercise directed at teaching and learning. Digital Pedagogy entails the application of digital technology tools and

resources for the science of teaching and learning. It has moved beyond using ICT for efficiency, motivation and effectiveness to adding value to society and the economy by enabling the creation, distribution, sharing and application of knowledge to complex problems encountered in real world situations of work and life. Pedagogy portrays the collected practices, forms, procedures, methods, and strategies of instructing and learning. It moreover incorporates information of approximately the points of instruction, evaluation, and understudy learning.

Digital pedagogical skills are characterized by the ability to use ICT in an academic environment, which combines the ability to learn through ICTs, plan information, execute code procedures, and evaluate. According to Biswas (2022), the mission of digital pedagogy is to help students to identify their passion and reach their goals. It is a new way of working and learning with ICT to facilitate quality learning experiences for 21st century learners. It moves the focus from ICT tools and skills to a way of working in a digital world. Effective digital pedagogies are based on the needs of individual students and incorporate contemporary teaching and learning strategies.

Digital pedagogical competency is nothing but the capacity of the instructors to form utilization of technology effectively in instructing. It features personalised approaches, intellectual engagement, rigorous learning, and connectedness to global contexts, supportive and collaborative classroom environments and connected curriculum, assessment and reporting to improve outcomes for students. It is much about using digital tools thoughtfully so as to decide whether to use digital tools or not, and to give attention to the impact of the digital tools that are used for teaching and learning. Thus, digital pedagogy is the use of electronic elements to enhance or to change to experience of education.

Some benefits of digital pedagogy, as opined by Biswas (2022), are:

1. Digital pedagogy is classified as the means of using digital tools in the classrooms and engages the students in a variety of interactive learning formats.
2. It keeps away the boredom and the work of learning is not labelled as labouring towards the acquisition of knowledge.
3. In digital pedagogy projects, short-term assignments are given, through which students are assessed based on their ability to demonstrate proficiency.
4. It receives far less funding as its output is considered to be not only knowledge-based, but student learning centred.

5. Its pedagogies are really good at being resourceful and make the students do with what is available.
6. It inevitably acknowledges the ability of students to control and have choices for learning at their own pace. It is therefore necessarily learner-centred and cost effective.
7. It is more personal which makes enhances creativity which in turn makes it effective for learner's retention and extended interest.
8. Personalisation is not only possible for digital interface but also for the storage of the data.

Challenges of Digital Tools Integration in Teaching-Learning Process

Digital skills are vital for educational development. However, many educational institutions find it difficult to integrate them fully in their curriculum due to one problem or the other. Some challenges of effectively integrating digital tools to teaching-learning process in tertiary institutions are thus highlighted.

Poor Funding: A basic challenge in integrating digital tools to teaching-learning process is poor funding as many tertiary educational institutions lack modern technology due to paucity of funds. Many academic staffers are not utilising digital tools in classroom interaction because of non-availability.

Technological Change: Another obstacle is the rapid pace of technological change because digital technologies evolve faster than some tertiary institutions can adapt to. Some educators also lack adequate professional development opportunities to build the necessary skills for their applications as new technology evolves.

Capacity for Utilisation: Some academic staffers lack the capacity to utilise the available tools because the needed periodic training for effective usage are not being provided. Thus they need development programmes on training and re-training to learn how to use digital technology effectively in teaching-learning process.

Role Apprehension: Some academic staffers are apprehensive about digital tools role concerning its application and utilisation. Some educators, in the words of Andersdotter (2023), express concerns about digital tools potentially displacing their roles or fundamentally changing the nature of teaching, leading to fear and resistance to adopting digital technologies. Academic staffers may fear that these tools will automate certain teaching tasks, reducing their authority or interaction with students. These concerns may contribute to a general reluctance to fully integrate them, despite its potential benefits.

Ethical Issues: Educators also face challenges in fully comprehending and navigating complex ethical issues such as data privacy, bias, and the potential for student surveillance. These concerns are particularly challenging for educators, as they may lack the expertise or support necessary to address these issues effectively in classroom environment.

Access to Digital Resources: The issue of equity and access to digital resources is a concern that educators have deemed to be significant. Some students have access to some digital tools while some others do not, thus face problems in receiving the kind of education they should. This calls for the need to fill the gap in the digital world, which is an obstacle for effective teaching of digital literacy in educational institutions. Ensuring that every student has the same opportunities for learning as any other student at school can lead to more inclusive education as well as development of the skills of communication and the internet which will give all the students the chance to be successful in the future.

Artificial Intelligence and Pedagogical Practices

Artificial intelligence (AI), as a digital tool, is a sophisticated technological systems designed to perform tasks that traditionally required human brain. Application of digital tools are promoting pedagogical practices and teaching activities in so many ways. Artificial Intelligence (AI), as a digital tool is positively influencing teaching methodology and students' motivation. The adoption and infusion of Ai-powered digital tools lifts up the standard of the teaching profession to meet global demands and challenges in the modern era. The infusion has positively engendered a paradigm shift through different methodological practices and that has greatly influenced learning motivation. AI tools such as Bing and ChatGPT have been referred to as objects that teachers can think with, especially in the teaching-learning situation to enhance ability to think critically, foster creativity, acquire problem solving skills and other 21st century learning skills (Haung, 2018).

AI tools, according to Hou, et al (2022), have been found to make learning accessible to all learners and increasing motivation to learn. Different open-access resources and platforms can be adopted for use to integrate AI powered-tools. The use of digital access platforms and AI powered tools such as intelligent tutoring system (ITS): ALEKS, and others enable students to have free access to learning materials and resources. The tools also provide personalized learning

experiences to learner. Teachers work load are no more on the high side with the adoption and use of AI tools. In the areas of course design, preparing course materials, marking and grading students' assessment, AI tools are increasingly used to reduce teacher's work.

According to Dakamni and Safa (2022), AI can help in the area of course selection, course design and in designing teaching procedures. AI tools make classroom feedback easier; help the teacher to produce efficient and accurate academic assessment with little effort. With more individualized learning approach teaching methodology is systematic, flexible and suitable for teachers. Its tools are useful in personalized and adaptive learning experiences, helping learners at all levels of education to analyse their work, write meaningful essays and get opportunity to receive feedback. For example, AL-powered assessment tools can analyse students' responses to assignments and profile personalized feedback to help students identify areas of strength and weaknesses. AI-powered assessment tools can analyse students' essay and provide feedback on grammar, structure and content (Nazaretsky, et al, 2022).

Artificial intelligence tools are important to professional development of teachers. AI helps faculty pedagogical experts develop insight and awareness of current teaching innovations. It also helps in providing educators with professional development opportunities to use the technology and ongoing support to ensure they integrate various Ai algorithms into their teaching practice. Apart from encouraging creative learning by giving students more flexibility and diversity in their education activities, AI tools help to promote research and scholarship of teaching among the students and the educators. Educators can be use evidence-based approach to study their own teaching and student learning in their classrooms to improve educational practices. SoTL transforms teaching from routine to a scholarly activity enhancing professional development and student outcomes. AI also helps to create tools that can be used to study and systematically integrate teaching research into higher education. It helps educators to explore and analyse large datasets of student work or identifying patterns of learning (Jani et al, 2024)

Digital Pedagogical Approach for Effective Teaching-Learning Process

Effective teaching requires critical thinking, communication skills, and teamwork, all of which are fostered by digital learning environment. This encourages students to actively engage in the learning process. Digital-powered learning environments can also adjust to students' innate

passions and interests, fostering intrinsic motivation, creativity, and curiosity. It encourages deeper learning and long-term memory retention by engaging students in meaningful ways, whether through immersive simulations, interactive lessons, or personalized learning pathways. This cooperative learning style encourages critical thinking, good communication, and teamwork, all of which enhance the effectiveness of instruction. Okunade (2024) assert that students are more inclined to work with peers, look for more resources, and participate in conversations when they are actively engaged in user-friendly digital technologies.

Kaswan, et al (2024) assert that with the development of digital technology, human-like teaching behaviours are rapidly being replicated, providing students with more engaging adaptable and interactive learning experiences. It enables individualized learning opportunities for each student's requirements and preferences. Bowden, et al (2021) aver that teachers who incorporate digital tools into their lessons are better able to modify lessons, examine student data, and offer focused assistance. They also emphasize how student interest moderates the relationship between its adoption, ease of use, efficacy, and teaching experience. They further opine that students are more likely to participate in learning activities, and produce higher learning results when they are actively engaged and enthusiastic in employing digital technologies. Thus, affirming a positive relationship between the use of digital tools and teaching effectiveness through the potentials of technologies to improve the quality of learning experiences and personalizing instructions.

Technology promotes effective, user-centric, inter-disciplinary, self-paced real-time teaching. It meets the needs of individual learners and is applicable to all learning methods. Therefore, it is widely used for teaching purposes in the education sector. By doing so, it encourages students to develop higher-level thinking skills, such as analysis, synthesis, application, and creation, which are very important in today's competitive world. Digital learning platforms have emerged as effective tools for both in-class and remote learning. Virtual learning tools, in the words of Akujieze (2024), can enhance academic performance, foster collaborative learning through peer participation, and hold teachers accountable for their students' learning. Utilizing social media in online learning can improve interactivity among students and researchers with supervisors, contributing to enhanced academic performance. Digital

pedagogical skills, coupled with ICT tools, as opined by Njoku (2015), have been identified as a solution to enhance learning experiences. He highlights that these skills allow students to communicate, edit, annotate, arrange, and generate texts quickly and freely.

The effectiveness of digital pedagogical tools in modern education is an issue that encompasses various aspects of teaching and learning. These tools have revolutionized the educational landscape, offering new opportunities for personalized, flexible, and interactive learning experiences. The integration of technology in education is not just about providing access to digital resources, it is about reshaping the educational environment to make it more responsive to the diverse needs and learning styles of students. Digital tools allows educators to tailor the learning experience to individual student needs, preferences, and learning paces, fostering a more inclusive and effective educational environment.

Digital literacy is becoming increasingly important, not just for academic success but also for employability and societal participation. Digital pedagogical approach, according to Akujieze (2024), encourages independent learning, critical thinking, and self-motivation. Cooperative and collaborative learning is also greatly enhanced by digital tools. These tools enable more dynamic interaction between teachers and students and among students themselves, fostering a more engaged and participatory learning environment. It also plays a crucial role in skill development, preparing students for a technology-driven world.

Froehlich (2023) identified pedagogical roles for teachers in technology-supported classrooms, which include setting joint tasks, rotating roles, promoting student self-management, supporting metacognition, fostering multiple perspectives, and scaffolding learning. The use of information and communication technology (ICT), in his words, is most effective when it challenges learners' understanding and thinking, involving both the teacher and the technology. The efficacy of these activities however hinges on careful planning and the teacher's skill in organizing and facilitating ICT-based activities. He argued that a compelling reason for incorporating ICT in schools is its potential to transform the teaching and learning process, acting as a catalyst in this transformation. Research findings of Akujieze (2024) revealed that access to a variety of digital resources enhances research skills, empowering candidates to assimilate and apply diverse perspectives. Additionally, digital assessments encourage the development of self-assessment skills, enabling candidates to critically reflect on their teaching

methodologies and personal progress.

Conclusion

This paper underscores the positive impact of digital pedagogical approach for effective teaching and learning process in tertiary education system in Nigeria The use of digital tools in education offers numerous benefits, including enhanced learning experiences, access to a wealth of information, improved collaboration, and cost-effectiveness. Technology has developed into all aspects of human endeavours, including teaching. It has completely changed the face of education and guidance and has brought almost unattainable changes in the way of information sharing. In today's situation, technology has improved learning, making teaching and learning more curious and adaptive. The use of digital tools in teaching has been found to have the capacity to eliminate some of the stimuli and instructive avoidance barriers that lead to poor achievement and insufficient learning.

Educators must understand digital tools and their applications in the teaching process. They should know how to successfully incorporate the right type of ICT into their subject while planning courses and providing learning experiences. The selected technology assets should complement educators' information and help learners develop information. There are many e-learning resources, and teachers with solid technical teaching skills can motivate and help students choose comprehensive reading materials using e-resources.

To enhance the successful implementation of digital pedagogy requires institutional support and infrastructures. Institutions need to provide the necessary resources, training, and support systems to ensure that educators can effectively teach in online environments. This includes not only technological support but also pedagogical, administrative, and policy guidance. Their effectiveness is contingent upon several factors, including the digital competence of educators, the adaptability of teaching methods, institutional support, and the integration of these tools into the curriculum in a way that enhances the overall educational experience. As technology continues to evolve, so must our approaches to teaching and learning to fully harness the potentials of these innovative digital tools.

Recommendations

It has been documented that educators' technological skills are a strong determinant of digital tools integration and effective teaching- learning process. It is thus recommended that adequate funding of tertiary institutions and investment in the latest digital tools are ensured to facilitate effective teaching-learning process.

Development programmes on training and re-training on effective usage of digital technology are recommended as some educators lack adequate professional development opportunities to build the necessary skills for their applications as new technology evolves, and even the capacity to utilise the available digital tools. They should be updated about current technical teaching skills to meet the needs of today's generation of learners.

Academic staffers need orientation on the capacity of digital tools in enhancing teaching-learning process, and the need not to be apprehensive about digital tools displacing their roles or fundamentally changing the nature of teaching-learning process. They also need basic knowledge about ethical issues such as data privacy, bias, and the potential for student surveillance.

There is also the need to fill access gap in the digital world which is an obstacle for effective teaching-learning process in tertiary institutions. Educational stakeholders should ensure that all students have access and equal opportunities for digital learning to ensure inclusive education.

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