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Transforming Education for a Digital Age: Agricultural Education for Global Impact

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Abstract
Digital age has significantly established itself as a crucial element in contemporary Education as well as in Agricultural Education in Nigeria by bridging the gap between theory and practice, boosting Agricultural production, reducing labour , energy , increasing students' engagement, improving practical skills, knowledge retention and interest. However, this study on transforming Education for a digital age and global impact in Agricultural Education will investigates concepts of digital age transformation, benefits of digital age transformation in Education, challenges of digital age transformation in Education, concepts of Agricultural Education, global impact of digital age in the teaching and learning of Agricultural Education, Merits of digital age transformation in Agricultural Education farmers. This paper recommends that government should implement a national strategy for digital education supported by robust policy frameworks and adequate funding. Educators and institutions must embrace digital tools and innovative teaching methodologies. The researcher also came to a conclusion that the integration of digital technologies into all aspect of educational process fostered new opportunities for lifelong leaving that go well beyond the traditional education, and Agricultural Education farmers are now adapting to the new innovations of the utilization of digital tools in their farms therefore, boosting Agricultural production.

Keywords*:* Age, Education, Digital, Global, Impart.

Introduction

The rapid advancement of technology has transformed virtually every sector, including education, causing a paradigm shift and digital transformation in education (Palacios-Rodríguez, Llorente-Cejudo, & Cabero-Almenara, 2023). Digital transformation in education involves integrating digital technologies into all aspects of the educational process, fundamentally, altering how educators teach and students learn. Panakaje, Rahiman, Parvin, Yatheen, and Irfana, (2024), noted that students have become very familiar with and show a strong preference for technologies; also students pursuing higher education have become particularly adept at using the internet and other digital devices as a medium of social interaction. The use of digital technology in education has become pervasive across the world (Vásquez-Peñafiel, Nuñez, & Cuestas Caza, 2023). It stands as one of the most influential forces transforming the educational landscape today. Numerous schools currently demonstrate robust support for integrating technology in the classroom by providing essential hardware such as computers, and internet connectivity, and implementing comprehensive programs aimed at improving technological (computer) level for both teachers and students. This transformation offers numerous benefits, such as increased accessibility to information, personalized learning experiences, enhanced engagement, add value to both commercial and subsistence farmers and most especially contributed global impact to Agricultural education in Nigeria

Concept of Digital Age Transformation

Digital transformation refers to the process of integrating digital technologies into all aspects of an organization's operations, fundamentally changing how it functions and delivers value to its stakeholders. This transformation goes beyond merely adopting new technologies; it involves rethinking and redesigning workflows, culture, and customer interactions to leverage the full potential of digital advancements. Ufua , Emielu, Olujobi, Lakhani, Borishade, Ibidunni, Osabuohien, (2021), sees digital transformation as cultural, organizational and operational change of a business enterprise, industry or ecosystem through the smart integration of digital technologies, processes and competencies across all levels of the organization in a strategic way to yield improvement and for the advancement of new development In addition, Nadkarni and Prügl (2021) described digital transformation as an actor-driven organizational transformation caused by the implementation of technology-driven digital disturbances. Hinings Gegenhuber, and Greenwood (2018), stated that digital Transformation is "the combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within

organizations, ecosystems, industries, schools, farms or fields. Digital transformation in education focuses on creating a more interconnected and dynamic ecosystem where technology enhances every aspect of learning experience by bringing together people, processes and data to enhance the learning environment for students, educators, parents, and other stakeholders in a world currently overtaken by technology (McCarthy, Sammon, and Alhassan, 2022). This holistic approach aims to not only optimize current educational practices but also to anticipate and prepare for future innovations hence, a reorganization of formal and informal learning environments as well as the educational content and delivery may become very necessary.

Benefits of Digital Age Transformation in Education

The integration of digital technologies in education is revolutionizing the way students learn, and educators teach. As the global education landscape continues to shift, Nigeria stand to gain significantly from embracing a holistic digital transformation in education. Faborode, (2021) listed out the following benefits of digital transformation in the educational system

Improved Accessibility

Digital transformation is a powerful tool in democratizing education, particularly in underserved and hard-to-reach areas of Nigeria. E- Learning platforms and remote learning technologies allow students in rural or conflict prone regions to access educational content, breaking down geographical barriers. Platforms such as Massive Open Online Courses (MOOCs) provide students with access to lectures, study materials, and peer interaction, irrespective of their location. Moreover, digital tools enable personalized learning, catering to diverse learning styles and paces. Unlike traditional classrooms where students are often expected to conform to a single method of teaching, digital platforms allow for tailored learning experiences. For instance, interactive software and applications can adjust the difficulty of content based on a student's performance, offering remedial support or advanced challenges as needed. This personalized approach not only improves retention but also empowers students to take control of their learning journey, fostering a more engaging and inclusive education system.

Enhancing Learning Outcomes

Digital technologies enhance the quality of education by providing interactive and multimedia rich learning environments. The use of interactive software, online resources, and multimedia tools makes learning more dynamic and engaging. Such as, video tutorials, simulations, virtual laboratories enable students to visualize complex concepts, which might otherwise be difficult to grasp through traditional methods. Such tools make abstract ideas more

concrete, enhancing comprehension and retention. Additionally, the application of artificial intelligence (AI) in education brings a new level of innovation in adaptive learning and assessments. AI-powered learning platforms can track individual students' progress, identifying strengths and weaknesses in real-time. Based on this data, the system can adjust the learning material, providing additional support in areas where a student may struggle and accelerating learning in areas of proficiency. AI-driven assessments also offer immediate feedback, enabling students to improve continuously. These innovations not only improve learning outcomes but also allow educators to focus on more personalized guidance, significantly enhancing the teaching and learning experience.

Bridging the Skills Gap

In the rapidly evolving global economy, digital transformation is critical for equipping students with the skills required for the 21st century workforce. The traditional education system in Nigeria, which has been largely theoretical, often fails to equip graduates with the practical skills needed for today's technology-driven economy. Digital transformation, however, can help bridge this gap by integrating digital literacy, coding, data analysis, and other tech-related skills into the curriculum, by incorporating digital skills training from early education through tertiary levels, students are better prepared for careers in fields such as information technology, engineering, artificial intelligence, and digital marketing. Moreover, teaching digital competencies aligns education with the demands of the global economy, ensuring that Nigerian graduates are competitive on the world stage. This alignment can also foster innovation, entrepreneurship, and a more resilient economy by producing a workforce capable of adapting to technological changes.

Cost Efficiency and Scalability

Digital transformation offers significant cost-saving advantages, particularly in relating to physical infrastructure and teaching resources, traditional education models require substantial investments in buildings, textbooks, and other physical resources. Digital platforms, however, reduce the dependency on these physical infrastructures by offering cloud-based resources, online libraries, and virtual classrooms. Schools and Universities can reach more students without the need to build additional facilities, making education more scalable and inclusive. Additionally, open educational resources (OER) and digital textbooks can be made available at a fraction of the cost of printed materials. E- Books and online course materials are often freely accessible or cheaper than their physical counterparts, making it easier for students and educational institutions to acquire necessary resources.(Adil, Ali, Sultan, Ashiq, & Rafiq (2024)

Challenges of Digital Age Transformation in Education

Inadequate Infrastructure

Lack of consistent electricity and internet access, especially in rural areas, is one of the most critical challenges to digital transformation in Nigerian education. Access to reliable electricity is a major constraint; according to World Bank (2021) only about 59% of Nigerians have access to electricity, with rural areas being the hardest hit without a stable electricity supply, digital devices and internet connectivity, which are the bedrock of digital education, become difficult to sustain. The situation is worsened by inadequate broadband infrastructure, particularly in underserved rural regions, leading to a pronounced digital divide between urban and rural areas, this disparity limits the reach of digital learning tools and platforms, leaving students in rural areas at a disadvantage (Adeleke, Ogundipe & Fapohunda, 2020).

Resistance to Change

Another significant barrier is the cultural and institutional resistance to adopting digital tools in education, many educators and administrators are accustomed to traditional teaching methods and may be hesitant to embrace digital learning due to concerns about its effectiveness or fear of disrupting established practices (Bates, 2015). Institutional inertia, where educational institutions are slow to change, can also inhibit progress. Additionally, teacher reluctance plays a crucial role in the slow adoption of digital technologies, this reluctance often stems from lack of digital literacy and the fear that technology may render them obsolete. Teachers may view the increasing use of artificial intelligence and online platforms as a threat to their roles, leading to resistance against digital transformation initiatives (Ibrahim, Mustapha, and Ayodele 2021). Overcoming this resistance will require investment in continuous professional development and targeted support programs to empower teachers to embrace and integrate technology into their pedagogical approaches.

High Costs

The financial burden of acquiring the necessary digital devices and infrastructure is another considerable challenge. Many schools, particularly public institutions, lack the funds to purchase laptops, tablets, and other essential digital tools. Additionally, families in low-income communities may struggle to afford these devices for their children, exacerbating existing educational inequalities (Okeke, Okeke, Madu, and Omenka, 2020). Beyond the cost of devices, the price of implementing digital infrastructure such as installing broadband internet and maintaining digital platforms can be prohibitive for many educational institutions, training teachers and staff in the

use of digital tools also incurs significant costs. Olawepo and Adegboye (2021), noted that even when digital facilities are available, insufficient funds to maintain and upgrade them can stall the progress of digital transformation efforts, without adequate investment from both public and private sectors, the financial burden will continue to limit access to quality digital education.

Policy Gaps and Poor Implementation

While Nigeria has made some strides in creating policies to support digital transformation in education, there are still critical policy gaps that impede progress. One of the most significant barriers is the lack of a cohesive national policy on digital education. Existing policies are often fragmented and fail to address the specific needs of digital transformation in a holistic manner.

Adeniran (2019) noted that Nigeria's technology policies in education are often outdated and lack the necessary frameworks to support large-scale digital integration in schools. Furthermore, inconsistent implementation of technology initiatives at both state and federal levels presents a major challenge; lack of coordination between these levels of government often leads to disjointed efforts, where some regions benefit from digital initiatives while others are left behind. For instance, some states have implemented e-learning programs, while others have yet to introduce any significant digital tools or platforms in their schools (Sowunmi and Oseni, 2020).

Concepts of Agricultural Education

Agricultural education is the type of education employed in training learners in the process of agricultural productivity as well as the techniques for teaching agriculture. Presently, Agricultural education in Nigeria takes place at the formal and informal levels, at informed level, extension officers or agents trained the learners or farmers on modern agriculture production processes outside the school system while, at the formal level, trained teachers teaches students at various level of educational system. (Eze, 2011) Suleiman (2011) described agricultural education as a vocational education which entails skill acquisition intended to prepare learners for a career in agriculture. The descriptions/definitions of agricultural education imply that it bestows in its recipients skills, abilities and competencies for career in agriculture and agro allied industries. Agricultural Education is an organized means of improving all level of learner's knowledge, skills and attitudes in agriculture. According to Halima (2014), Agricultural Education could also be seen as an education employed in training learners in the basic art of farming combined with the science of teaching agriculture

Global Impact of Digital Age on the Teaching and Learning of Agricultural Education

The use of digital tools in teaching and learning of Agricultural Education is necessary because for decades, course materials were designed around textbooks, teachers taught the content

through lecture method and the activities were designed to enforce the content knowledge (Angadi, 2014). According to Shamsideen (2016), "education is the primary agent of transformation towards sustainable development since it increases people's capacities to transform their visions into reality". The author further said that "education not only provides scientific and technical skills, it also provides the motivation, justification, and social support for pursuing and applying them". The present day curricular provide aptitude and performance of the information rather than factual knowledge. Digital tools facilitate the transfer of knowledge effective in accordance to the curriculum. The use of Digital tools in teaching and learning of Agricultural Education will give students opportunities to showcase their skills, ideas, creativities, boost their knowledge as well as collaborative learning among students.

When teachers are digitally literate and trained to use Digital tools, their expertise can lead to higher order thinking skills, provide creative and individualized options for students to express their understandings, and leave students better prepared to deal with on-going technological change in society and the workplace (Goodwin, 2012). With the application of digital tools in the teaching and learning of Agricultural Education students can independently master teaching materials, choose the pace of work, repeat the material that is not sufficiently clear and track their progress. Interactive multimedia content provides a great advantage of modern learning over traditional learning. Digital application in teaching and learning of Agricultural Education also facilitate feedback between the teacher and the student (Bakare and Olaniyi, 2017). Multimedia as a powerful device of digital tools assists students in their thinking activities and also helps them to share and express their knowledge.

Software application like databases, and excel sheets help students in understanding the concept by doing, develops an independent approach towards problem solving hence computers help students in developing high order thinking (McMahon, 2009). Integrating digital tools into delivery process of agricultural education can increase the effectiveness, broaden knowledge, ensure retention of skills, and also enable lecturers to expose students to those practical aspects that will not be possible in the classroom (McFarlane & Sakellariou, 2010)

Merits Digital Age Transformation and Agricultural Education Farmers

Global Positioning System (GPS)

GPS is a satellite-based radio-navigation system that can provide extremely accurate worldwide, 24-hour, 3- dimensional location data (latitude, longitude, and elevation). GPS in agriculture allows farmers to precisely navigate to specific locations in the field to collect soil samples or monitor crop conditions. GPS accurately records latitude, longitude, and elevation

information. Global Positioning System satellites transmit signals and permit GPS receivers to compute their location in real-time; and provide continuous positions while moving (Dhanaraju, Chenniappan, Ramalingam, Pazhanivelan, & Kaliaperuma, 2022). The exact location information offers farmers the opportunity to discover the precise position of field data, such as pest occurrence, type of soil, weeds, and other barriers. The technique makes it easier to identify different field locations so that the required inputs (seed, fertilizer, herbicide, insecticide, and water) may be applied to a specific field.

Internet of Things (IoT)

The Internet of Things refers to a network of interconnected items and technology these connections are built to collect massive amounts of data while maintaining effective communication between operations (Creedon, Robinson, Kennedy, and Riordan 2019). This technology allows all agricultural devices and equipment to be linked together to make the appropriate decisions in irrigation and fertilizer supply (Kumar and Periasamy, 2021). Sensors can be deployed on the farm – to the ground, in water, in vehicles, etc. to collect data. The collected data is stored in the cloud system or server and accessed by the farmer via the internet or their mobile phones. By optimizing data collection while minimizing human interaction, the Internet of Things makes it easier to access information. Nowadays farmers can leverage IoT to enhance their farm efficiency such as irrigation, fertilization, harvesting information, and climate forecast by monitoring with sensors to improve their decision making (Pivoto, Waquil., Talamini.,Finocchio, Dalla Corte, and deVargas, 2018).

Remote Sensing

Remote sensing is a useful tool for collecting lots of information simultaneously from a distance. Sensor Technologies such as photo electricity, electromagnetic, conductivity, and ultrasound, are used to estimate soil texture and structure, nutrient level, vegetation, humidity, vapour, air, temperature, etc. The smart irrigation system includes many sensors for monitoring water levels, irrigation efficiency, climate sensors, etc. Data from remote sensing may identify different types of crops, classify pests and weeds, find stress points in soil and plant conditions, and keep track of drought. The standard sensors used in smart farming networks are soil moisture sensors that are used to measure the change in soil moisture, soil temperature used to monitor the temperature in soil, air temperature, soil pH value, humidity, N, P, K sensors, etc. The sensors can gather different data to be used for the analysis of the farm statutes and for making a suitable decision. (Kumar, Kumar, Periasamy, 2021).

Precision Agriculture

Precision agriculture (PA) is referred to as engaging current methodologies, tools, and technologies such as artificial intelligence and image processing into livestock farming, pest and disease management, crop management, soil and irrigation Management, and the challenges of a conservative farming system Precision agriculture is very successful, improves productivity, is viable and cost effective to the farmer, boosting the economy and reducing food insecurity (Danbaki, Onyemachi, Gado, Mohammed, Agbenu, and Ikegwuiro, 2020). Some of the tools used in precision agriculture include yield monitors which have the capability of indicating yield (kg/ha), total kg, ha/hour; hectare worked, and grain moisture content (Sahu, Chatterjee, Mukherjee, and Sharma, 2019). The authors noted that yield monitors are attached to crop harvesting equipment providing information on crop yield; the global positioning system (GPS) is a network of 24 satellites orbiting the Earth that gives exact satellite time and location to ground receivers.

Differential Global Positioning System (DGPS) is a way of improving GPS accuracy. This uses the pseudo-range errors measured at a known location to adjust the measurements made by the other GPS receivers within the same general geographic area; Geographical Information System (GIS) uses feature attributes and location data to produce maps. The modern precision farming system is an amalgamation of several techniques including Global Positioning System, sensor technologies, geographic information system, variable rate technologies, grain yield monitors for mapping, and crop management (Roy and George 2020).

Smart Indoor/ Greenhouse Farming

Various variables, including the rise in food prices social tensions, land disputes, the severity of persevering climate change, and increased urbanization, contribute to the absence of effective planning for food security and sustainability. Crops grown in indoor conditions are less affected by the environment. As a result, crops grown traditionally under suitable conditions are today being raised at anytime and anywhere by the use of sensors and communication devices. The success of crop production under a controlled environment depends on various factors, such as shed structures and material for controlling wind effects, aeration systems, accuracy of monitoring parameters, decision support system, etc. (Shamshiri, Kalantari, Ting, Thorp, Hameed, Weltzien, Ahmad, and Shad, 2018). Sensors are utilized in an IoT based greenhouse to detect and keep track of internal characteristics including humidity, temperature, light, and pressure. (Akka & Sokullu, 2017).

Drones

A drone is a flying device that can fly a pre-set course with the help of an autopilot and GPS coordinates. It can perform numerous functions that lead to improving agricultural practices such as monitoring crop health. By scanning a crop using both visible and near infrared light, drone-carried devices can identify which plants reflect different amounts of green light. This information can produce multispectral images that track changes in plants and indicate their health. Also, areas of a field that are dry or require improvement can be determined by drones equipped with hyper-spectral, multispectral, or thermal sensors. Consequently, drones can be used in crop spraying as they scan the ground and spray the correct amount of liquid, modulating distance from the ground and spraying in real time for even coverage (Abdelgader, 2015). This results in increased efficiency with a reduction in the amount of chemicals penetrating groundwater. Crop inspection Drones equipped with several sensors, 3D cameras, thermal, multi-spectral, and optical imaging cameras can be used to monitor crop conditions and diseases, plant health indicators, vegetable density, pesticide prospecting, fertilizer, canopy cover, mapping, field prediction, plant count, plant height measurement, field water mapping, exploratory reports, nitrogen measurement (Islam, Rashid, Pasandideh, Ray, Moore, and Kadel, 2021).

Conclusion

The study on the transformation of education in a digital age and a global impact in Agricultural Education as experience a paradigm shift which includes integrating of digital technologies into all aspect of educational process that fostered new opportunities for lifelong leaving that go well beyond the traditional education. The Agricultural Education farmers are now adapting to the new innovations of the utilization of digital tools in their farms therefore, boosting Agricultural production

Suggestions

From the afore-discussions the following suggestions were made

i. The study on the transformation of education in a digital age and a global impact in Agricultural Education has recommends a call to government to implement a national strategy for digital education, supported by robust policy frameworks and adequate funding.

ii. Educators and institutions must embrace digital tools and innovative teaching methodologies.

iii. Private stakeholders, including technology companies, financial institutions, should contribute to infrastructural development and partnerships that can scale digital learning nationwide

References

Adeleke, A., Ogundipe, O., & Fapohunda, B. (2020). The digital divide: A Nigerian perspective. *Journal of Information Technology for Development*, 26 (1), 50- 64.

Adil, H. M., Ali, S., Sultan, M., Ashiq, M., & Rafiq, M. (2024). Open education resources' benefits and challenges in the academic world: A systematic review. *Global Knowledge, Memory and Communication, 73*(3), 274–291

Akkas, M. A., & Sokullu, R. (2017) An IoT-based greenhouse monitoring system with Micaz motes. *Procedia ComputerScience* 113, 603–608.

Akkerman, S. F., Bakker, A., & Penuel, W. R. (2021). Relevance of educational research: An ontological conceptualization. *Educational Researcher, 50* (6), 416-424.

Angadi, G.R. (2014). An Effective Use of ICT is a Change Agent for Education. Online *International Interdisciplinary Research Journal*, 4, 516-528

Bakare, A.A & Olaniyi, E.T. (2017). Use and Application of ICT in Teaching and Learning for Quality Higher Education in Nigeria: A Literature Analysis. *Greener Journal of Educational Research*,7(2):015-0210, http://doi.org/10.15580/GJOR.2017.2.0 20617017

Bates, A. W. (2015). Teaching in a digital age: Guidelines for designing teaching and learning. BC campus. https://opentextbc.ca/teachinginadigitalage

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2020). Mapping research in student engagement and educational technology in higher education: A systematic evidence map. *International Journal of Educational Technology in Higher Education, 17*, 1-30.

Chen, X., Xie, H., Zou, D., & Hwang, G. J. (2020). Application and theory gaps during the rise of artificial intelligence in education. *Computers and Education: Artificial Intelligence*, *1*, 100002.

Chung, Y. C. Y., Chang, H. H., & Kitamura, Y. (2021). Digital and traditional media advertising and business performance of agribusiness firms – Empirical evidence in

Japan. *Agricultural Economics*, *67(2021)* (No.2),51–59. https://doi.org/10.17221/393/2020-AGRICECON

Cook, S., Jackson, E. L., Fisher, M. J., Baker, D., & Diepeveen, D. (2021). Embedding Digital Agriculture into Sustainable Australian food Systems: Pathways and Pitfalls to Value Creation. *International Journal of Agricultural Sustainability*. https://doi.org/10.1080/14735903.2021.1937881

Creedon, N.; Robinson, C.; Kennedy, E.; & Riordan A.O. (2019). *Agriculture 4.0: Development of serological on farm immune sensor for animal health applications*. IEEE Sensors, 1-4.

Danbaki, C. A., Onyemachi, N. C., Gado, D. S. M., Mohammed, G. S., Agbenu, D., & Ikegwuiro, P. U. (2020). Precision agriculture technology: A literature review. *Asian Journal of Advanced Research and Reports*, 14(3).

Dhanaraju, M., Chenniappan, P., Ramalingam, K., Pazhanivelan, S., & Kaliaperumal, R. (2022). Smart Farming: Internet of Things (IoT)- based sustainable agriculture. Agriculture, 12, 1745. https://doi.org/10.3390/ agriculture12101745

Eze, O.M & Bayode, K. (2011). The role of Agricultural Education in alleviating poverty for the actualization in vision 20:20:20. *Journal of Women in College of Education. 15, 2, 202-207.*

Faborode, T. (2021). The role of telecommunications in Nigeria's digital education revolution. *African Journal of Education and Technology*, 12 (3), 125- 137.

Giles, D. B., & Stead, V. (2021). Big Data won't feed the world: global agribusiness, digital imperialism, and the contested promises of a new Green Revolution. *Dialectical Anthropology*, *46* (1), 37–53. https://doi.org/10.1007/S10624-021-09631-8

Haleem, A., Javaid, M., Qadri, M. A., & Suman, R. (2022). Understanding the role of digital technologies in education: A review. *Sustainable Operations and Computers*, *3*, 275-285.

Halima, E. I. (2014). The Problems and Prospects of Agricultural Education in Nigeria. *Journal of Resourcefulness and Distinction 7*(1) 33-39

Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization*, *28*(1), 52-61.

Ibrahim, A., Mustapha, H., & Ayodele, O. (2021). Teacher resistance to digital transformation in Nigerian schools:An analysis. *Journal of Education and Digital Learning*, 18(2),45-57.

Islam, N., Rashid, M.M., Pasandideh, F., Ray, B., Moore, S., & Kadel, R., (2021). *A review of applications and communication technologies for Internet of Things (IoT) and Unmanned Aerial Vehicle (UAV) based sustainable smart farming. Sustainability* 13 (4), 1821.

Kumar, T. U., & Periasamy, A. (2021). IoT Based Smart Farming (EFARM)' S. International *Journal of Recent Advances in Multidisciplinary Topics* 2 (4), 85–87.

.McCarthy, P., Sammon, D., & Alhassan, I. (2022). Digital transformation leadership characteristics: A literature analysis. *Journal of Decision Systems*, *32* (1), 79-109.

McFarlane, A & Sakellarious, S. (2010). The Role of ICT in Science Education.*Cambridge Journal of Education*, 33(3) 30-45.

McMahon.G. (2009)"Critical Thinking & ICT Integration in a Western Australia Secondary School". *Educational Technology and Society*. 12 (4), 269- 281.

Olaniyan, O. F., Oladejo, O. A., Adeola, A. C., Bello, S. F., Bashiru, H. A., & Oseni, S. O. (2024). Integration of genomics into community-based breeding programmes for chickens: an overview of opportunities, challenges, and potential benefits. *World's Poultry Science Journal*, 1-21.

Okeke, L., Madu, C., and Omenka, R. (2020). Digital education and socioeconomic disparities in Nigeria. African Educational Review, 17(3), 132-145.

Palacios-Rodríguez, A., Llorente-Cejudo, C. & Cabero-Almenara, J. (2023) Editorial: Educational digital transformation: new technological challenges for competence development. *Frontier Education*. 8:1267939. doi: 10.3389/feduc.2023.12679

Panakaje, N., Ur Rahiman, H., Parvin, S. R., P, S., K, M., Yatheen, & Irfana, S. (2024). Revolutionizing pedagogy: navigating the integration of technology in higher education for teacher learning and performance enhancement. *Cogent Education*, *11*(1), 2308430.

Pivoto D., Waquil P. D., Talamini E.,Finocchio, C. P. S., Dalla Corte V. F, & deVargas M, G. (2018). Scientific development of smart farming technologies and their application in Brazil. *Information Process Agriculture* 5:21–32.

Shamshiri, R. R., Kalantari, F., Ting, K. C., Thorp, K. R., Hameed, I. A., Weltzien, C., Ahmad, D., & Shad, Z. (2018). *Advances in greenhouse automation and controlled environment agriculture: A transition to plant factories and urban agriculture. International Journal of Agriculture, Biology and English* 11, 1–22.

Shamsideen, S.A. (2016). Factors Responsible for Improving Low Academic Performance on Adult enrolees in Selected Literary Centres in AjeromiIfelodun Local Government Area of Lagos State. Pyrex *Journal of Educational Research and Reviews.*2 (5) 37-42.

Sahu, B., Chatterjee, S., Mukherjee, S., & Sharma, C. (2019). Tools of precision agriculture: A review. *International Journal of Chemical Studies* 7. 2692-2697.

Ufua, D., Emielu, E., Olujobi, O., Lakhani, F., Borishade, T., Ibidunni, A., & Osabuohien, E. (2021). Digital transformation: A conceptual framing for attaining Sustainable Development Goals 4 and 9 in Nigeria. *Journal of Management and Organization, 27*(5), 836-849.

Vásquez-Peñafiel, M. S., Nuñez, P., & Cuestas Caza, J. (2023). Competencias digitales docentes en el contexto de COVID-19. Un enfoque cuantitativo. *Pixel-Bit: Revista de Medios y Educación, 67, 155-185.*

World Bank. (2021) Access to electricity in Nigeria: A critical challenge.World Bank. https://www.worldbank.org/en/country/nig eria/overview