CHAPTER SIX

The use of Digital Technology and its Ethical Consideration in Industrial Technology Education in Nigeria.

By

Igwebuike, Edward Dimkpa (PhD)
Department of Electrical/Electronics
School of Secondary Education (Technical)
Federal College of Education (Technical),
Omoku, Rivers state, Nigeria

AND

Osoh, Precious Chikobi
Department of Electrical/Electronics
School of Secondary Education (Technical)
Federal College of Education (Technical),
Omoku, Rivers State, Nigeria

ABSTRACT

In recent years, the integration of digital technology into the educational system especially in Industrial Technology Education *has become increasingly prevalent in Nigeria. Previous scholarly works on the use of Digital Technology in Education in Nigeria have been without special scrutiny of its ethical considerations. Hence, this paper examines the ethical considerations surrounding the use of digital technology in* Industrial Technology *Education and emphasizes the unique challenges faced by Nigeria's educational landscape. Understanding the ethical implications of incorporating digital technology into* Industrial Technology *Education in Nigeria is crucial, as it has the potential to shape the way we teach and learn in the digital era. This paper explores the ethical dimensions in a few key areas which include data privacy and security, students' autonomy and well-being, access and digital divider, digital literacy and skills and pedagogical transformation. This paper aims to prove insights into the ethical dilemmas that emerge from the integration of digital technology in* Industrial Technology *Education in Nigeria. It offers recommendations for policymakers, technologist, educators, and stakeholders to ensure that the benefits of digital education are maximized while mitigating potential ethical pitfalls. By addressing these ethical considerations, the educational sector in Nigeria can strive towards an inclusive, secure and culturally sensitive digital learning environment.*

KEYWORDS: Ethics, Digital Technology, Education, Industrial Technology Education.

INTRODUCTION

In today's rapidly advancing digital landscape, technology has permeated almost every aspect of our lives, including education. As nations strive to navigate the demands of a globalised world, Nigeria has also embraced the transformative potential of digital technology to revitalize its education sector (Etim and Ubi, 2019). In recent years, the integration of digital technology in Nigeria schools has opened up new avenues for enhancing teaching and learning experience. However, amidst this digital revolution, it is imperative to prioritize ethical considerations to ensure that the use of these technologies aligns with the values, principles, and cultural context of Nigerian society. Therefore, this paper seeks to explore the ethical

considerations surrounding the use of digital technology in Industrial Technology Education in Nigeria. By examining the potential benefits and risks, it also aim to shedding light on the importance of developing ethical frameworks and strategies that policymakers, educators and technology developers can adopt to strike a healthy balance between technological advancements and societal values.

At a time when access to digital technology is quickly developing across Nigeria, it is critical to address several complicated ethical questions that arise from its use in educational settings. With the potential to considerably transform teaching methods, improve access to knowledge and facilitate personalized learning experiences, digital technology can bridge educational gaps, empower educators, and unlock the potential of students. Nevertheless, we must also acknowledge the ethical dilemmas associated with its use. Ultimately, the goal of this paper is to foster a comprehensive understanding of the ethical dimensions that surround the use of digital technology in Industrial Technology Education in Nigeria. By actively engaging in these discussions and proposing solutions, we can promote ethical awareness, responsible technology practices, and equitable access to education for all. In doing so, Nigeria can harness the opportunities provided by digital technology while maintaining its rich cultural heritage and advancing the social makeup of the nation.

ETHICS

Ethics pertains to a branch of philosophy that deals with moral principles and values guiding human behaviour and decision-making. Ethic is the moral compass guiding our decisions. It is about the value and principles that guide people decision and action. It is like people internal compass that help them navigate life challenges. It help us have respect for others, honesty and integrity, responsibility and accountability, compassion and empathy. It revolves around questions of what is considered right and wrong, good and bad, correct and incorrect and the overall principles that should govern human conduct. One key aspect of ethics is the exploration and analysis of moral dilemmas. These are situations where individuals must make choices that potentially involve conflicting moral principles. It involves evaluating the consequences of an action and determing the best course of action based on ethical theories, reasoning, and norms (Eti, 2024).

Ethical theories provide frameworks to understand and analyzed moral problems. Some well known ethical theories include utilitarianism, deontology, virtue ethics, and consequentialism, each offering different perspectives on evaluating moral choices. Utilitarianism for instance, focuses on miximizing overall happiness or utility for the greatest number of people. On the other hand, deontology emphasizes adhering to moral duties and principles, regardless of the consequence. Virtue ethics focuses on developing good character traits, while consequentialism considers the outcomes or consequences of actions.

Ethical discussions often involve debates surrounding different societal issues. For instance, topics like abortion, euthanasia, capital punishment, environmental conservation, and social justice touch upon ethical considerations. When exploring ethics, it is crucial to consider the underlying value systems and cultural norms that shape moral judgments. Values such as fairness, justice, honesty, compassion, and autonomy play important roles in ethical decision-making. Moreover, ethics is not limited to individual behaviour but also extends to organizations and profession. Various fields have their ethical guidelines or codes of conduct, such as medical ethics, business ethics, journalism ethic, and legal ethics (Beauchamp and childress, 2019). In education, educational ethics is about the principles and values that guide teaching, learning and research some key aspects include academic integrity, fairness and equity, respect for students' rights and dignity, promoting critical thinking and intellectual freedom and finally maintaining confidentiality and privacy.

Educational ethics has a profound impact on both students and teachers for students, it

(1) Fosters a safe and inclusive learning environment
(2) Promotes academic integrity and values honesty
(3) Encourages critical thinking and independent thought
(4) Support personal growth and development.

For teachers, it

(1) Guides their professional conduct and responsibilities.
(2) Helps build trust and respect with students
(3) Encourages inflective practice and continuous improvement
(4) Upholds the integrity of the education system

Digital Technology

Digital technology according to Oti (2024) refers to technological devices and systems that use digital signals or data for communication, storage, and processing of information. It has revolutionized various aspects of our lives, including communication, entertainment, business, healthcare and education. One of the key elements of digital technology is the use of binary digits (bits) to represent and process information. These bits, which can take the value of either 0 or 1, form the building blocks of digital systems. Through manipulation of these bits, digital devices can perform complex calculations, store vast amounts of data, and facilitate faster and more efficient communication.

Digital technology includes microcomputers like laptops, desktops, tablets, notebooks, and smartphones, as well as communication tools and applications that facilitate the processing of digital information. The functionality and logical operations of digital technologies are made possible by micro processes that are programmed to execute diverse functions. It involves using new technologies to meet the evolving demands of a highly digital world. Haleem, Javaid, Qadri and Suman (2022), defined digital technology as that which denotes a diverse array of technologies, tools, services, and applications employing various forms of hardware and software. They are used to generate, store, disseminated and retrieved digital information. Digital technology enhances the way and manners teaching-learning takes place in a learner centered instructions through e-learning platform. Saarikko, Westergren and Blomquist (2020), asserted that digital technology transforms every facet of daily life, thereby making more efficient, scalable and more beneficial. It entails moving from analogue to digital data which is vital to the digital revolutions. The way people communicate, learn, and work has been revolutionized by digital technology. It significantly influences contemporary society and its cultures. Individuals worldwide are now interconnected through digital media and networks in unprecedented ways, facilitating the swift and efficient exchange of information across these interconnected networks.

The business world has also been disrupted by digital technology. E-commerce has transformed the way we shop, with online marketplaces like Amazon and Alibaba enabling seamless transactions and global distribution. Furthermore, digital tools for productivity and collaboration, such as project management software and video conferencing platform, have made remote work and virtual teams a reality. In healthcare, digital technology has improved patient care and access to medical services. Electronic health records (EHRs) have allowed healthcare providers to securely store and share patient information, enhancing communication and coordination between different healthcare professionals. Moreover, tele-health services have emerged, allowing patients to remotely consult with doctors, access medical advice, and even receive treatment.

In education, digital technology has transformed teaching and learning processes. Interactive digital tools, virtual learning environment, and online course have made education more accessible and

personalized. Students can access a wealth of information literally at their fingertips, and teachers can create engaging multimedia concent to enhance learning experiences. These are just a few examples of how digital technology has transformed various aspects of our lives. Its impact is far-reaching and continues to evolve rapidly with advancements such as artificial intelligence, internet of things, and blockchain technology.

Industrial Technology Education

Technology according to Dimkpa and Osaji (2024) is the scientific study of mechanical and applied sciences. It is also the subject that has their practical application in industry. Technology can be said to be: Science of industrial arts or organization and management of a country's industrial resources by experts for the good of the whole community. The UNESCO (1978) for instance, defines technology education as "education designed at upper secondary and lower tertiary levels to prepare middle level personnel (technicians, middle management etc.); and at university level, to prepare engineers and technologists for higher management positions.

Industrial technology education includes general education, scientific and technical studies and related skill training. The components of industrial technology education may vary considerably depending on the type of personnel to be prepared and the education level concerned" The National policy on education regarded industrial technology education as an integral part of general education in Nigeria. It therefore defined it in the following way, industrial technology education is used as a comprehensive term referring to those aspects of the educational process involving, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life.

Purpose of Industrial Technology Education (ITE)

1. To provide manpower in applied science, technology and commerce particularly at sub-professional levels.
2. To provide the technological knowledge and vocational skills necessary for agriculture, industrial, commercial, and economic development.
3. To provide people who can apply scientific knowledge to the improvement and solution of environmental problems for the convenience of man.
4. To give an introduction to professional studies in engineering and other technologies.
5. To give training and impart the necessary skills leading to the production of craftsmen, technicians, and other skilled personnel who will be enterprising and self-reliant, and to enable young men and women to have an intelligent understanding of the increasing complexity of technology.

The use of Digital Technology in Education in Nigeria

The field of education in Nigeria have been revolutionalized by digital technology, bring numerous benefits to both students and educators. Digital technology is being employed in Industrial Technology Education in Nigeria in diverse manners which includes the following:

(1.) **Online Learning Platforms:** The use of online learning platforms, such as NOUN e-Courseware (National Open University of Nigeria), e-learning Portal of Ahmadu Bello Univeristy, and JAMB e-learning platform, have made education accessible to a wider population of students (Popoola and Nworie 2020).

(2.) **Interactive Multimedia Content:** Digital technology has enabled the creation of interactive multimedia content, making learning more engaging and efficient. Examples include video lectures, animations, and virtual simulations (Afolayan and Kwanda, 2021).

(3.) **Mobile Learning:** The use of mobile devices for learning has gained popularity in Nigeria. With the increasing penetration of smartphones, students can access educational content anytime, anywhere. The mobile Learning Network Nigeria (MoLeNET) project is one such initiative supporting the integration of mobile technology in education (Schmidtz and Smart, 2019).

(4.) **Virtual Classrooms:** Virtual classroom platforms, like ZOOM and Google Classroom, have become instrument in facilitating remote learning. These platform allow students and teachers to interact in real-time, enabling a seamless learning experience even in challenging circumstances (Yusuf and Obala, 2020).

(5.) **Open Educational Resources (OER):** The use of open educational resources has become increasingly common in Nigeria, as it helps reduce the cost of textbooks and other learning materials Website like e-Resources for Schools and Empowering Nigerian Youth (EnY), provide open access to quality educational resources (Kalejaye, 2020).

These above discussion provide support for the significant impact of digital technology on Industrial Technology Education in Nigeria, showcasing the various ways it is being utilized to enhance learning outcomes and improve access to education.

Ethical Consideration in the use of Digital Technology in Industrial Technology Education in Nigeria

In recent years, the advent of digital technology has transformed the education landscape in Nigeria, bringing numerous opportunities as well as ethical considerations.

(1.) Data Privacy and Security: Data protection is central to maintaining trust in both the educational institution and digital technologies. (Mertala and Kiopfenstein 2020) Therefore, it is essential to address privacy concerns associated with the collection and use of student data. The use of digital technology requires the collecting and storing of student information, including personal details, academic progress, and behavioural patterns. It is crucial for educational institutions to implement robust data protection measures to safequard this sensitive information and ensure compliance with data protection regulations. Failure to do so can have serious implications such as identity that or unauthorized access to sensitive information. Educators must ensure student data is protected from unauthorized access or misuse, warranting consent and the adoption of secure systems. In line with Nwala, (2021) institutions should comply with relevant data protection regulations such as the Nigeria Data Protection Regulation (NDPR) of 2019.

(2.) Students autonomy and well-being. There is a need to consider the implications of using digital technology for student autonomy and well-being. While technology can enhance learning experience, excessive reliance on digital platforms might lead to the decline of critical thinking and creativity. It is crucial to strike a balance between incorporating technology into the education system and maintaining traditional teaching methods that promote problem-solving skills and social interaction.

(3.) Access and Digital Divide: Ethical considerations related to access include not only access to the internet but also access to appropriate digital resources and devices (Okwilajwe, 2018). Policymakers must address the digital divide by providing equal opportunities for all students to access digital technologies for education. Efforts such as government initiatives and partnerships with private entities can help bridge the digital divide in Nigeria. Addressing the issue of the digital divide cannot be overemphasized, especially in a country like Nigeria where access to technology and internet connectivity might be limited in certain areas. Implementing digital education iniatives without providing equal opportunities for all students can exacerbate disparities in education and worsen existing social inequalities.

(4.) Digital Literacy and Skills: Education authorities must ensure that teachers and students develop essential digital literacy skills and competencies (Etim and Ubi, 2019). Ethical considerations involved empowering educators to effectively integrate digital technologies into the curriculum while ensuring students develop critical thinking, online safety, and digital citizenship skills. Teacher training programs and continuing professional development iniatives should prioritize digital literacy education for educators.

(5.) Cyberbullying: Preventing online harassment and harm. It is also a harsh reality online. It can be really hurtful and isolating. If you are experiencing it. know that you are not alone, block, reported talk to someone you trust about it.

(6.) Intellectual property: Respecting creator's rights and ownership. Not prirating other's works without permission.

(7.) Misinformation: Combating fake news and biased content. It is important that you verify sources of information check, fact and be critical in thinking. Also one need to be sensitive in some headlines.

In the same vein, incorporating digital technology should align with pedagogical principles and educational goals rather than pursuing technologies adoption solely for the sake of it (Adeoluwa, 2020). Ethical considerations involve employing digital technologies in a manner that enhances and supplements learning, rather than replacing traditional teaching methods. Teachers should have autonomy to determine appropriate digital tools and ensure technology does not compromise the quality of education. Conclusively, ethical considerations in the use of digital technology in Industrial Technology Education in Nigeria are critical for ensuring responsible practices that uphold students' privacy, bridge the digital divide, and promote digital literacy and skills. Policymaker, educational institutions, and educators should collaborate to address these considerations and develop frameworks that prioritize ethical and responsible technology integration. By doing so, Nigeria can harness the transformative potential of digital technologies while safeguarding the rights and well-being of students.

RECOMMENDATIONS

Ethical considerations in the use of digital technology in Industrial Technology Education in Nigeria are an important aspect to ensure the responsible and fair use of technology for educational purposes. Here are some recommendations:

(1.) Digital literacy should be promoted among educators and students to ensure that they possess the necessary skills to navigate technology ethically and responsible. Educators should be equipped with the essential knowledge and competencies to guide students in their digital interactions.

(2.) The privacy and personal data of students and teachers should be protected by implementing stringent data protection policies, specially regarding the collection, storage, and use of personal information. Also, establish clear guidelines on who has access to student data and ensure it is properly secured.

(3.) A culture of responsible digital citizenship should be fostered by educating students about online safety, cyberbullying, and appropriate behaviour on digital platforms. At the same time, encourage educators to teach digital citizenship as part of the curriculum

(4.) Equitable access to digital technology must be ensured by providing appropriate infrastructure and devices to students of all backgrounds. In the same vein, the needs of students with disabilities should be considered and necessary accommodations must be provided to ensure their participation in digital education.

(5.) Educators and students should be aware of copyright laws and intellectual property rights when creating and using digital content. Along with these, ethical practices such as proper citation, attribution, and respect for intellectual property rights should also be promoted

CONCLUSION

With the advancement of digital technology, its integration into the education sector has rapidly grown in recent years. Nigeria, as a developing nation, is witnessing a significant increase in the utilization of digital technology in education. While digital technology offers vast opportunities to enhance teaching and learning, it also raises important ethical considerations. By addressing issues such as equitable access, data privacy, digital literacy, and responsible use of technology, Nigeria can ensure that the transformative power of digital education is harnessed ethically for the benefit of all students. Likewise, effective policies and guidelines need to be in place to tackle issues such as cyberbullying, plagiarism, and copyright infringement in digital education. Educators should work to create a safe and respectful online learning environment, while also promoting digital literacy skills among students to ensure responsible and ethical use of technology. This paper considered the use of digital technology and its ethical consideration in Industrial Technology Education in Nigeria, emphasizing the need for responsible and ethical practices.

REFERENCES

Adeoluwa, E.O. (2020). The need for reforming the Nigeria education system. *Journal of Educational Policies and Current Practices,* 6(1).

Afolayan, A., and Kwande, O.(2021). Utilization of Online Learning Learning Platforms for Supporting Teaching and learning in Nigeria Universities. *African Journal of Computing and ICT.* 10(2), 7-26.)

Beauchamp, T.L., and Childress, J.F (2019). *Principles of Biomedical Ethics*. New York: Oxford University Press.

"Digital Technology." Encyclopaedia Britannica, www.britannica.com/technology/digital-technology.

Dimkpa, I.E and Osaji, O.A (2024). Digital Technology. A veritable tool for Industrial Technology Education Transformation in Nigeria. In Adeyemi, B.A, Yara P.O.. and Fatungase, O.B (ed) *Books of Reading in inclusive Education in the 21st century.* Faculty Education, Leadcity University, Ibadan.

Dzubak, C.M., and Smark, K.L. (2019). Continuous professional development for rural Nigerian teachers using mobile technology: A delineate and pre-pilot study. *Teaching and Teacher Education,* 67,63-73).

Etim, I.E., and Ubi, M.U. (2019). An Assessment of Teachers' Digital Literacy Skills in Nigerian Secondary Schools: Teachers' Awareness and Attitudes. *International Journal of Instruction,* 12(4), 847-862.

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

Johnson, (2020) 10 ways Digital Technology is Transforming Our Lives." www.huffpost.com/entry/10-ways-digital-technology-is-transforming-our-lives_b_587123cle4b02b5f858a2fdl.

Kalejaye, O.O. (2020). Assessing the Use of Open Educational Resources by Students of Information Studies in Nigeria. *International Journal of Education, Information Technology, and Others,* 4(2), 1 – 8.)

Mertala, P., and Klopfenstein, K. (2020) Resolving Ethical Dilemmas in Digital Education. *Digital Education Review,* 38, 209-222.

Nwala, S. C. (2021). Digital Education in Nigerian Colleges of Education: An Overview of Policies and Prospects. *International Journal of Computers & Technology,* 16(4), (2021).6354-6361.

Okwilagwe, E.A. (2018). Ethical issues in the integration of information and Communication Technologies in educational institutions. *Journal of Scientific and Engineering Research (IJ) SERC,* 5(1), (2018). 47-56.

Oti, R. A (2024). Ethical consideration in the use of digital technology in education in Nigeria. In Adeyemi, B.A, Yara P.O.. and Fatungase, O.B (ed) *Books of Reading in inclusive Education in the 21st century.* Faculty Education, Leadcity University, Ibadan.

Popoola, S.O., and Nworie, J. (2020). The Effectiveness of Interactive Multimedida on Learning Outcomes in Nigeria Tertiary Institutions. *Turkish Online Journal of Educational Technology-TOJET*, 16(1), 54-63.)

Saarikko, T., Westergren, U.A, and Blomquist, T. (2020) Digital transformation: Five recommendations for the digital conscious firm. *Business Horizons 63 (6) 825-839*

Schmidtz, D. and Smith, L. (2019) Ethic: *Inventing Right and Wrong.* New York: McGraw-Hill Tertiary Education in Nigeria (University of Ibadan),

"The Impact of Digital Technology on Society and Economy: A Review*."Journal of Research in Humanities and Social Science,* Vol.9,No. 4, 2021, pp. 1167 – 1172.

Yusuf, M.A.M., and Obala, A.W. (2020). Exploring the Acceptance of Virtual Learning (Classrooms) among Secondary School Students in Nigeria during Schools COVID-19 Lock-Down. Universal *Journal of Educational Research,* 8(9B), 134-139.)