

INFRASTRUCTURE, PEDAGOGY AND POLICY: REVITALIZING TECHNICAL EDUCATION IN ONDO STATE FOR THE DIGITAL AGE

Adebayo Taofeek Salami*

Science Department, Faculty of General Studies, Adeyemi Federal University of Education, Ondo, Nigeria

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Abstract: The digital age necessitates Technical Education to turn out graduates with competencies for industry. This study assessed infrastructure, pedagogy and policy for revitalizing technical education in Ondo State. Five research questions guided the study. A descriptive survey design was adopted. The population of 144 instructors in the 5 State owned Government Technical Colleges in Ondo State was used. Data were collected with a 40-item questionnaire (QIPPRTE) with reliability coefficient of 0.72. Mean, standard deviation and frequency counts were used for analysis. Findings revealed that College management should ensure proper implementation and monitoring of digitalization policies. Government should encourage public-private partnership with industry to provide modern equipment. Major challenges are inadequate funding, poor power supply and lack of infrastructure. Key strategies are provision of funding, regular training and stable power. It was concluded that technical education in Ondo State is not ready for the digital age. It was recommended that College management should ensure proper implementation and monitoring of digitalization policies. Government should encourage public-private partnership with industry to provide modern equipment.

Keywords: Technical Education, Infrastructure, Pedagogy, Policy, Digital Age, Ondo State.

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Introduction

Digital technologies are the fixation of the twenty-first century, and they have revolutionized both worldwide employment and the delivery of education. A workforce with ICT skills, digital literacy, and the ability to adapt to technological transformation is crucial in the global digital economy. As a result, in order to stay competitive, several countries have made digitalizing education a top priority. Nigerian technical colleges, including those in Ondo State, continue to operate primarily with analog workshops, outdated equipment, and traditional teaching methods. This has created a gap between graduate output and industry requirements in the digital nation (UNESCO-UNEVOC, 2020). The Federal and Ondo State Governments have made efforts through Ondo State Government (ODSG), Tertiary Education Trust Fund (TETFUND) and Universal Basic Education Commission (UBEC) to furnish technical colleges, but the impact on the production of digital skills is still minimal.

Infrastructure, pedagogy, and policy are the three main pillars that determine the success of any educational restructuring. Infrastructure is the availability of digital tools like computers, the internet, simulators and contemporary workshops; pedagogy is the teaching methods and digital competencies of the instructors while policy includes government structures, funding and curriculum placement with demands of the digital economy. Owo, Oke-igbo, Iworo Oka, Okitipupa and Idanre are the locations of five state-owned technical colleges in Ondo State. Graduates from these colleges should be competitive in the digital economy. However, scant data points to deficiencies in the digital infrastructure, instructors' lack of proficiency in digital pedagogy and poor policy

implementation. Technical education in Ondo State will continue to produce graduates who are unemployed in the digital age if these gaps are not filled. This study aims to investigate infrastructure, pedagogy, and policy in order to revitalize technical education in Ondo State for the digital era.

Statement of the Problem

The goal of using technical education to promote youth employability and economic development in Ondo State will not be realized as long as the problem of poor infrastructure, low instructor digital proficiency and weak policy execution persists. Therefore, the study set out to evaluate these three pillars. Technical colleges in Ondo State seem not producing graduates who are digitally skilled.

Purpose of the Study

The major purpose of this study was to examine infrastructures, pedagogy and policy for revitalizing technical education in Ondo State for the digital age. Specifically, the study sought to:

1. To evaluate the level of digital infrastructure available in technical colleges in Ondo State;
2. To evaluate the extent to which instructors use digital pedagogical methods in teaching;
3. To evaluate the effectiveness of existing policies on digitalization of technical education in Ondo State;
4. To identify the challenges hindering digital revitalization of technical education in Ondo State;

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5. To recommend strategies for improving infrastructure, pedagogy and policy for digital revitalization of technical education in Ondo State.

Research Questions

The following research questions guided the study:

1. What is the level of digital infrastructure in technical colleges in Ondo State?
2. To what extent do instructors use digital pedagogical methods in technical colleges in Ondo State?
3. How effective are existing policies on digitalization of technical education in Ondo State?
4. What are the challenges to digital revitalization of technical education in Ondo State?
5. What strategies can be adopted to improve infrastructure, pedagogy and policy for digital revitalization of technical education in Ondo State?

Significance of the Study

The findings of the study will be of benefit to government, policy makers, school, administrators, students, graduates and researchers.

The study will give the Ondo State government, the Ministry of Education, and NBTE accurate information about the current conditions of technical college facilities, pedagogy and policy. This will guide funding allocation, decision-making and the creation of policies meant to digitize technical education in Ondo State. Additionally, the study will assist the HODs and principals of Ondo State five technical institutions in identifying gaps in pedagogical methods and digital infrastructure. It will enable them to make well-informed decisions on the donor interventions that ODSG and TETFUND require to save the system.

The study will contribute to the production of technically trained graduates who are employable in the global digital nation by identifying strategies for digital revival. In Ondo State, this will reduce young unemployment and increase self-sufficiency. Additionally, the study will contribute to the body of knowledge already available on Nigerian technical education's digitization. Additionally, it will be a resource for scholars in the future who might want to conduct similar studies in other states.

Scope of the Study

The study covered five government technical colleges in Ondo State and focused on instructors' notes.

Literature Review

Concept of Technical Education in the Digital Age

Technical education is the portion of education that results in the acquisition of fundamental scientific knowledge and practical and applied skills for gainful employment (NBTE, 2021). According to Uwaifo (2011), technical education equips students with technology literacy while training technical workers to initiate, facilitate and implement technological growth. In the traditional sense, it concentrated on manual skills using analog machines and hand tools. Nonetheless, a number of academics have defined technical education in the digital age. In order to develop graduates who are globally competitive, Ekpenyong (2021) characterized it as vocational training that incorporates ICT

and mechatronics, automation and internet-based tools. According to Ibe (2022) it is the use of computers and simulation to teach technical skills. To Ogwo (2020), it is training using contemporary equipment, similar to what is used in industry today. Technical education graduates must be proficient in ICT, robotics, artificial intelligence, data analytics and digital fabrication in the digital age (Kozma, 2022). This means that workshops need to be transformed into neat laboratories with internet access, CAD/CAM software, 3D printers and simulators. Any technical education system that does not use digital tools would produce graduates who are unemployed in the current economy, (UNESCO-UNEVOC, 2020).

Digital Infrastructure in Technical Colleges

The physical and technological resources that support education are referred to as infrastructure (Oloruntegbe & Isaac, 2021). According to Ayinde (2021), infrastructures are the fundamental organizational and physical structures and facilities that facilitate production, processing, distribution and enhance people's quality of life. Infrastructure is defined by Fagbohunka and Oladehinde (2021) as the fundamental services and facilities such as communication, energy, water supply and transportation that foster industrial and economic growth. Computers, internet access, smart classrooms, projectors, e-learning platforms, simulators, CAD software and alternate power supplies are examples of digital infrastructure. Adeyemi and Ajayi (2023) in a study of technical colleges in Southwest Nigeria found that 78% of the schools lacking the functional ICT laboratories and over 90% experienced unstable power supply. The World Bank (2021) reported that pathetic infrastructure is the single greatest barrier to digitalization of TVET in Sub-Saharan Africa. Without constant power supply and internet, tools like virtual reality and online learning cannot function as it is anticipated. TETFUND and NBTE have made the involvement through equipment grants, but the blow is rough (FME, 2022).

Digital Pedagogy and Instructors' Competence

Pedagogy refers to the means and practice of teaching (Kozma, 2022). Muttawu and Adebayo (2021) also defines pedagogy as the art and science of teaching that involves the methods, strategies and practices teachers use to facilitate effective learning and develop learners' knowledge, skills and attitudes. Ossai, et al (2024) refers to pedagogy as the procedures and practices used by teachers to ease effective teaching and learning with stress on learner-centered and inventive instructional approaches. The use of technology to enhance instruction, such as online assessment, virtual labs, simulations, and blended learning, is known as digital pedagogy. For digital pedagogy to be helpful instructors must possess technological pedagogical content knowledge (Aina & Ogundele, 2022). However, several studies have shown low digital competence among technical education instructors in Nigeria. Aina and Ogundele (2022) found that 65% of technical teachers had not received ICT training in the last five years. In the same vein, Olabiyi et al (2016) and Nwagwu (2023) found out from their studies that many vocational technology teachers' adoption of ICT was constrained and affecting their ability to improve teaching performance through technology. Kozma (2022) emphasized that investing in infrastructure without training teachers is like giving a car to someone who cannot drive. Therefore, regular training, retraining and certification of instructors are critical for digital restoration.

Policy Framework for Digitalization of Technical Education

Policy is viewed as a structured process through which governments make decisions and establish courses of action to address public issues and guide development outcomes. (Jombo & Fagbadebo, 2026). Onimisi (2025) refers to policy as deliberate course of action adopted by government to address societal problems, respond to citizens' needs and achieve specific developmental objectives. Policy provides the legal and administrative structure for educational transformation (Bello, 2020). In Nigeria, several policies support digitalization of technical education. These include the National Policy on Education, NBTE Blueprint for Revitalizing Technical Education and TETFUND Act. The FME (2022) also launched the National Policy on Digitalization of TVET. Regardless of these policies, execution remains feeble. Bello (2020) noted that policy formulation in Nigeria is strong, but execution caught up by poor funding, lack of monitoring and political intervention. This implementation gap means that even good policies do not transform to improve practice in classrooms.

Challenges to Digital Revitalization of Technical Education

Literature has identified many challenges. Such challenges are inadequate funding, poor power supply, lack of infrastructure and internet, limited digital skills among teachers and instructors, high cost of digital resources (Oloruntegbe & Isaac (2021; Oyekunle et al, 2024; Ogunode et al, 2023; Othman et al, 2025; Omwirhiren 2025). The World Bank (2021) stated that most African governments allocate less than 3% of education budget to TVET. UNESCO-UNEVOC (2020) reported that only 22% of TVET institutions in Africa have reliable internet.

Strategies for Revitalizing Technical Education for Digital Age

In order to address these challenges, scholars have proposed multi-stakeholder strategies. NBTE (2021), Dawodu et al (2025), Darzar et al (2026) and Othman et al (2025) recommended increased funding, provision of alternative power like solar, integration of digital skills and emerging technologies into the curriculum, continuous training and digital capacity development for instructors and Public Private Partnership with industry. Kozma (2022) advocated for the "3Ps" Framework i.e. People, Policy and Pedagogy. UNESCO-UNEVOC (2020) also suggested the establishment of Centre of Excellence in each state to serve as centers for digital training.

Theoretical Framework

The study was guided by the theory developed by Punya Mishra and Mathew Koehler in 2006. The framework was named Technological Pedagogical Content Knowledge (TPACK). The framework explains that the knowledge instructors need to effectively integrate technology into teaching and learning.

TPACK argues that successful technology-based education does not depend only on having digital devices or internet facilities; rather, effective digital learning occurs when instructors combine three major areas of knowledge (content knowledge, pedagogical knowledge and technological knowledge. Content knowledge refers to instructors' understanding of subject matter they teach. In technical education, it includes knowledge of areas such as mechanical technology, woodwork technology, building technology, electrical and electronics technology and other vocational areas. Pedagogical knowledge is the instructors' knowledge of teaching methods, classroom management,

assessment strategies and other approaches that help students learn effectively. The technological knowledge in its own sense is the instructors' ability to use digital tools, software, online platforms, simulation technologies that support teaching.

The theory further explains that effective digital teaching occurs through the interaction of these three forms of knowledge; technological pedagogical knowledge (knowing how technology can improve teaching methods), technological content knowledge (knowing how technology can represent and enhance specific subject content) and pedagogical content knowledge (knowing how to teach specific subject areas effectively). This theory is related to this study because revitalizing technical education requires more than providing computers and digital equipment but it requires instructors who can use available technologies effectively for practical and skills-based learning. Therefore, in view of this, the TPACK framework exposed it that the success of digital transformation in technical education depends on the interaction between qualified instructors, appropriate teaching methods and available technologies.

Methodology

The study adopted a descriptive survey research design. The design was considered appropriate because it sought to collect data from instructors on their perception of infrastructure, pedagogy and policy as factors for revitalizing technical education in Ondo State. Survey design enables the researcher to gather information from a large population within a short period and describe the situation as it exists. The study was carried out in Ondo State, Nigeria. Ondo State has five government-owned technical colleges located in Okeigbo, Iwara-Oka, Owo, Idanre and Okitipupa. These institutions run NBTE-accredited technical programmes and are directly under the supervision of the Ondo State Ministry of Education. The population for this study comprised all instructors in the technical departments of the five government technical colleges in Ondo State. Based on the records obtained from Ondo State Ministry of Education site 2025, the total population of academic staff was estimated at 144. Due to the manageable size of the population, census sampling technique was adopted. Therefore, all the 144 instructors in the five colleges constituted the sample for the study. This ensured that every instructor had an equal opportunity to participate and increased the generalizability of the findings. The instrument for data collection was a structured questionnaire titled "Questionnaire on Infrastructure, Pedagogy and Policy for Revitalizing Technical Education (QIPPRTE)". The questionnaire was divided into five sections: Section A: Demographic information of respondents; Section B: Digital infrastructure; Section C: Digital pedagogy; Section D: Policy effectiveness; Section E: Challenges and strategies. The 4-point Likert scale was used to avoid neutral responses. The decision rule was mean ≥ 2.50 = Agree, mean < 2.50 = Disagree. The face and content validity of the instrument was established by experts: two from the department of Vocational and Technical Education and one from Measurement and Evaluation. Their corrections and suggestions were used to produce the final version of the questionnaire. To determine the reliability of the instrument, a pilot test was conducted on 20 instructors in one technical college outside the study area. Data collected was analyzed using Cronbach Alpha method. A reliability coefficient of 0.72 was obtained, which indicated that the instrument was reliable for the study. Direct administration was done by the researcher.

Data collected were analyzed using descriptive statistics precisely, mean and standard deviation.

Research Question One: What is the level of digital infrastructure in technical colleges in Ondo State?

Results

The data collected were analyzed based on the research questions.

Table 1: Mean and Standard Deviation of Instructors' Responses on Digital Infrastructure

S/N	ITEM	N	Mean	SD	Decision
1	My college has adequate number of functional computers	144	2.15	0.84	Disagree
2	There is stable internet connectivity	144	1.98	0.75	Disagree
3	Equipped with simulators and CAD software	144	2.31	0.87	Disagree
4	Constant power supply	144	1.76	0.72	Disagree
5	Digital projectors and smart boards available	144	2.42	0.90	Disagree
6	Workshops have modern digital machines	144	2.28	0.87	Disagree
7	Students have access to computer laboratories	144	2.55	0.95	Agree
8	Subscribe to e-learning platform	144	1.90	0.81	Disagree
9	Adequate technical support /IT personnel	144	2.10	0.82	Disagree
10	Infrastructure supports teaching for digital economy.	144	2.20	0.85	Disagree
	Mean Cluster	144	2.17	0.84	Disagree

Source: Field Survey, 2025

Table 1 shows that with a cluster mean of 2.17 which is below the criterion mean of 2.50, instructors disagreed that there is adequate digital infrastructure in technical colleges in Ondo State. Only item 7 had a mean above 2.50. This implies that lack of

computers, internet, power supply and modern equipment is a major challenge.

- **Research Question Two:** To what extent do instructors use digital pedagogical methods in technical colleges in Ondo State?

Table 2: Mean and Standard Deviation of Instructors' Responses on Digital Pedagogy

S/N	ITEM	N	Mean	SD	Decision
11	I am competent in the use of digital tools for teaching.	144	2.38	0.81	Disagree
12	I regularly use power point, videos and animations.	144	2.65	0.92	Agree
13	I use simulation software to demonstrate practical skills.	144	2.10	0.73	Disagree
14	I guide students to use internet for assignments	144	2.72	0.96	Agree
15	I have received training on digital pedagogy in last 2 years.	144	2.05	0.71	Disagree
16	I use Google classroom/whatsapp/Zoom for assignments.	144	2.81	0.98	Agree
17	I integrate CAD and diagnostic software in teaching	144	2.20	0.80	Disagree
18	My assessment includes digital portfolios and online tests	144	2.12	0.78	Disagree
19	I encourage students to use digital platforms for projects	144	2.68	0.94	Agree
20	My teaching methods prepare students for digital economy.	144	2.45	0.86	Disagree
	Mean Cluster	144	2.42	0.85	Disagree

Source: Field Survey, 2025

Table 2 shows a cluster mean of 2.42 which is below the criterion mean of 2.50. This indicates that instructors to a low extent use digital pedagogical methods in technical colleges in Ondo State. While instructors agreed on basic use of whatsapp, power point and internet guidance, they disagreed on the use of

simulation, CAD, online assessment and recent training. This suggests poor digital teaching competence.

- **Research Question Three:** How effective are existing policies on digitalization of technical education in Ondo State?

Table 3: Mean and Standard Deviation of Instructors' Responses on Digital Policy Effectiveness

S/N	ITEM	N	Mean	SD	Decision
21	Government policies support digitalization of technical education.	144	2.78	0.83	Agree
22	NBTE curriculum includes digital and ICT competencies.	144	2.85	0.88	Agree
23	TETFUND and ODSG interventions have improved facilities.	144	2.41	0.79	Disagree
24	There are clear policies guiding use of digital tools.	144	2.35	0.75	Disagree
25	Government organizes regular training for instructors.	144	2.18	0.72	Disagree
26	Policies are effectively implemented in my college.	144	2.13	0.67	Disagree
27	Funding for digital infrastructure is sufficient and reasonable	144	1.95	0.64	Disagree
28	Collaboration between government, industry and schools exists.	144	2.30	0.73	Disagree
29	Current policies address demands of digital economy.	144	2.60	0.81	Agree
30	Regular monitoring and assessment of policies is done.	144	2.09	0.60	Disagree
	Mean Cluster	144	2.36	0.74	Disagree

Source: Field Survey, 2025

In Table 3 of cluster mean of 2.36, instructors claimed that the current digitalization policies were ineffective. Although instructors agreed that policies exist on paper and curriculum mentions ICT, they disagreed on implementation, funding, training

and monitoring. This implies a gap between policy formulation and execution in Ondo State.

- **Research Question Four:** What are the challenges to digital revitalization of technical education in Ondo State?

Table 4: Challenges to Digital Revitalization as Perceived by Instructors

S/N	Challenge	Frequency	%
1	Inadequate funding	137	95.2
2	Poor power supply.	132	91.3
3	Lack of digital infrastructure.	126	87.3
4	Poor internet connectivity	123	85.7
5	Low digital competence of instructors.	117	81.0
6	Poor policy implementation.	112	77.8
7	Outdated curriculum.	97	67.5
8	Lack of technical support personnel	103	71.4

Source: Field Survey, 2025

Table 4 shows that the major challenges to digital revitalization as identified by instructors are inadequate funding 137(95.2%), poor power supply 132(91.3%) and lack of digital infrastructure 126(87.3%). Other challenges include poor internet, low instructor competence and poor policy implementation. This

implies that without addressing these challenges, digitization will remain a mirage.

- **Research Question Five:** What strategies can be adopted to improve infrastructure, pedagogy and policy for digital revitalization of technical education in Ondo State?

Table 5: Strategies for Digital Revitalization as Suggested by Instructors

S/N	Challenge	Frequency	%
1	Provision of adequate funding and digital infrastructure	135	93.7
2	Regular training and retraining of instructors on digital skills.	128	88.9

3	Provision of stable power supply and internet.	120	83.3
4	Effective implementation and monitoring of policies.	113	78.6
5	Partnership with industry for equipment and training	108	74.6
6	Review of curriculum to include digital.	101	69.8

Source: Field Survey, 2025

Table 5 indicates that instructors suggested provision of funding and infrastructure 135(93.7%) and regular training 128(88.9%) as the most important strategies. Other strategies include stable power, policy implementation and industry partnership. This suggests that a 3-prolonged approach focusing on infrastructure, pedagogy and policy is needed.

Discussion of Findings

The finding in research question one revealed that the level of digital infrastructure in technical colleges in Ondo State is low with a cluster mean of 2.17. This finding agrees with Oloruntegbe and Isaac, (2021) who reported that most technical colleges in Nigeria lack modern digital facilities.

Research question two finding was that instructors to a low extent use digital pedagogical methods with a cluster mean of 2.42. This supports the work of Adeyemi and Ajayi (2023) who found that technical education instructors in Nigeria have low digital competence.

The finding of research question three showed that existing policies on digitalization are not effective with a cluster mean of 2.37. This finding aligns with Federal Ministry of Education (2022) which stated that policy implementation gap is a major challenge in Nigerian technical education.

Research question four finding identified inadequate funding (95.2%), poor power supply (91.3%) and lack of digital infrastructure (87.3%) as the major challenges. This finding corroborates UNESCO-UNEVOC (2020) and World Bank (2021).

Research question five finding suggested provision of adequate funding and infrastructure (93.7), regular training of instructors (88.9% and stable power supply (83.3%) as key strategies. This aligns with the recommendations of NBTE (2021) and Kozma (2022). Finally, the findings indicate that technical education in Ondo State is not yet ready for digital age. The simultaneous challenges of poor infrastructure, low digital pedagogy and weak policy implementation must be addressed.

Conclusion

Based on the findings, it was concluded that technical education in Ondo State is not ready for the digital age due to poor digital infrastructure, low use of digital pedagogy and ineffective policies.

Recommendations

The following recommendations were made:

Government /TETFUND should provide adequate funding for digital infrastructure and alternative power supply.

NBTE should organize regular training and retraining of instructors on digital pedagogy.

College management should ensure proper implementation and monitoring of digitalization policies.

Government should encourage public-private partnership with Industry to provide modern equipment.

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