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**EMERGING TRENDS IN MODERN BUILDING AND WOODWORK
TECHNOLOGY: IMPLICATIONS FOR INDUSTRIAL TECHNICAL
EDUCATION**

B

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BENIN CITY

NOVEMBER, 2024

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TECHNOLOGY: IMPLICATIONS FOR INDUSTRIAL TECHNICAL
EDUCATION**

BY

DAVID OMONIGHO EMMANUEL

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4 A RESEARCH WORK SUBMITTED TO THE DEPARTMENT OF
VOCATIONAL AND TECHNICAL EDUCATION, FACULTY OF EDUCATION,
UNIVERSITY OF BENIN, BENIN CITY, IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE
EDUCATION (B.Sc.Ed) DEGREE IN INDUSTRIAL AND TECHNICAL
EDUCATION.

NOVEMBER, 2024

APPROVAL

I hereby approve this research project as ³adequate in scope and quality in the partial fulfillment of the requirements for the award of Bachelor of Science Education (B.Sc Ed) Degree in Industrial Technical Education (Building and Woodwork Construction).

Dr. Louis Osaigbovo
(Project Supervisor)

Date

CERTIFICATION

We undersigned, certified that this research work was carried out by **David Omonigho Emmanuel**, with matriculation number EDU2006104¹ in the Department of Vocational and Technical Education, Faculty of Education, University of Benin, Benin City.

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Head of Department

DATE

DEDICATION

This research project is dedicated to Almighty God, the source of all understanding and motivation, for his mercy and protection throughout my time in school.

ACKNOWLEDGEMENTS

I am deeply grateful to God Almighty for His endless mercy and strength, which have guided me along my journey and led me to the successful completion of my project work.

My heartfelt gratitude goes to Dr. Louis Osagboivo, my project supervisor, for his excellent assistance and unfailing support throughout the study process. His patience and experience have helped shape this work, and I am grateful for the opportunity to study under his supervision.

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ABSTRACT

This study investigates the increasing developments in building and woodworking technologies, with an emphasis on how they affect Nigeria's construction industry and technical education system. Using a descriptive survey research approach, data was obtained from 120 industrial technical education students using a standardized questionnaire. The findings highlighted major trends, such as ¹² the use of computer-aided design (CAD) tools and advanced woodworking machines, as well as a pressing need for skills and expertise to keep up with these technological improvements. The study also found weaknesses in the present curriculum, emphasizing its inadequacy in meeting industrial demands. These findings highlight the necessity of integrating technical education with technological improvements to increase worker preparation and stimulate innovation in the construction industry.

2 CHAPTER ONE

INTRODUCTION

Background of the Study

The construction industry plays a vital role in Africa's development. It contributes significantly to economic growth, infrastructure development, and job creation. Woodwork, a traditional and essential African skill, continues to be a cornerstone of construction, furniture making, and handicraft production. The rapid advancements in building and woodwork technology have profoundly impacted the landscape of industrial technical education. As the industry continues to evolve, examining the emerging trends and their implications for the future of educational programs in this field is crucial. One of the most significant developments in modern building and woodwork technology is integrating computer-aided design (CAD) and computer-aided manufacturing (CAM) systems. These digital tools have revolutionized the design, planning, and production processes, allowing for unprecedented levels of precision, efficiency, and customization. Consequently, educational institutions must adapt their curricula to ensure that students are equipped with the necessary skills to utilize these advanced technologies effectively.

Another prominent trend is the increasing emphasis on sustainable and environmentally friendly building practices. The growing concern for environmental conservation has driven the industry to explore new materials, construction methods, and energy-efficient solutions. This shift has created a demand for professionals who possess a

deep understanding of sustainable design principles and the ability to implement them in real-world projects.

The construction and woodworking sectors have seen substantial modifications as a result of technological breakthroughs, innovation, and a growing demand for environmentally friendly materials. The construction and woodworking industries have not stagnated while global industries change. Prefabrication, 3D printing, and the use of environmentally friendly materials are examples of emerging technologies that are now major forces behind change. For example, energy-efficient materials, renewable energy systems, and enhanced construction methods that lessen environmental impact are currently key components of sustainable building technologies (Olugbenga, 2020).

Due to rising urbanization and population increase in Africa, particularly Nigeria, adopting contemporary building and woodworking technology has become increasingly vital. With cities increasing and housing demand rising, the building sector must take new techniques to fulfill the needs of the growing population. According to Akinyemi (2019), new construction techniques such as modular construction and engineered wood products such as cross-laminated timber (CLT) are gaining popularity in Nigeria due to their low cost and time efficiency. These developments are transforming traditional building and woodworking processes, driving the sector toward modernization and sustainability.

The educational sector, particularly ³² technical and vocational education and training (TVET), is critical in preparing future workers with the skills required to manage the demands of modern industry. To remain relevant, industrial technical education must adapt

to the changing needs of the construction and woodworking industries. To equip students for the modern workforce, technical education programs must include instruction in cutting-edge technology and sustainable practices (Okorie, 2021). This synchronization of industry trends and educational curricula is critical for increasing graduates' employability and assuring their capacity to contribute effectively to the industry's progress.

Emerging innovations in woodworking, such as ⁸ the use of digital fabrication tools, computer-aided design (CAD), and automation, have major consequences for technical education. According to Okochi and Nwosu (2023), there is an increasing demand for qualified workers capable of operating complex machinery and software in the woodworking industry. This necessitates a curriculum reform in technical education programs to incorporate digital literacy and hands-on experience with modern woodworking instruments. Failure to incorporate these innovations into school curricula may result in a skills gap, leaving graduates unprepared to meet the demands of the growing sector.

Furthermore, the emergence of ⁴⁴ additive manufacturing, commonly known as 3D printing, has introduced a new level of flexibility and customization in the woodworking industry. Students aspiring to enter this field must be trained in the operation and application of these cutting-edge technologies to remain competitive in the job market.

However, the industry faces challenges like rapid urbanization, increasing demand for sustainable practices, and the need for a skilled workforce to keep pace with technological advancements.

Statement of the Problem

The rapid growth of building and woodworking technologies poses a major challenge to the educational system, particularly in the field of industrial technology education. Modern building technologies such as modular construction, 3D printing, and the use of sustainable materials are transforming the sector, but educational curricula at many technical institutions, particularly in Nigeria, have not kept up. As a result, graduates of technical programs are frequently unprepared to meet the demands of a quickly changing sector, creating a skills gap between what the business requires and what is taught in schools.

One of the biggest issues that ITE programs face is an outdated curriculum that may not fully reflect the most recent construction trends and technologies. This can leave graduates unprepared to fulfill the industry's changing needs. Furthermore, a lack of practical training opportunities might impede students' capacity to apply theoretical knowledge to real-world settings, reducing their employability and effectiveness as construction professionals. The inadequate incorporation of technology into ITE curricula may impede students' capacity to adapt to the digital age. Emerging technologies such as building information modeling (BIM) and digital fabrication are becoming more important in the construction sector, but many ITE programs may not provide students with the requisite skills to use these tools successfully.

Graduates face the difficulty of being unable to design buildings utilizing modern computer-aided design software. This lack of skill has created a significant barrier to

employment since many construction organizations now prefer individuals who are proficient in these digital technologies. The mismatch between industry demands and the skills obtained by students in technical school programs has left many graduates unemployed, despite the increased demand for trained experts in the construction and woodworking industries. Furthermore, graduates who lack hands-on experience with these technologies during their studies would struggle to compete in a work market that increasingly prizes digital literacy and technical proficiency.

The failure to align industrial technical education with modern building and woodworking technology has serious consequences for Nigeria's economic and industrial development. The increased demand for skilled labor in sectors such as 3D printing, prefabrication, and sustainable construction methods is still unmet due to outmoded curricula that do not address these innovations. This mismatch between technical education graduates' abilities and industry demands has contributed to high youth unemployment rates since many lack the relevant competence required in today's competitive labor market.

Nigeria's construction industry has a significant shortage of workers skilled in the use of current building technologies, such as digital tools for planning and erecting structures. This mismatch between industry needs and educational output raises questions about the technical education system's ability to generate people who can effectively contribute to the growth of the construction and woodworking industries. Furthermore, the lack of incorporation of sustainable building processes and materials into training programs

has hindered Nigeria's ability to fully adopt environmentally friendly and resource-efficient construction methods.

Similar issues exist in the woodworking industry. Emerging developments, such as ¹² the use of computer-aided design (CAD) and advanced digital manufacturing technologies, are changing the industry. However, technical education programs continue to emphasize conventional woodworking processes, leaving students unprepared for the digital and automated environments they will confront on the job. This lack of training not only affects graduates' employability but also influences the industry's overall competitiveness. In an increasingly globalized world, Nigeria risks falling behind if its technical education system does not generate a workforce capable of operating complex woodworking machines and software.

Another issue is a lack of access to contemporary training equipment and facilities in many technical institutes throughout Nigeria. Low financing and bad infrastructure have resulted in most technical institutions still using antiquated equipment, restricting students' exposure to cutting-edge innovations. Graduates who lack hands-on expertise with the tools and materials used in modern construction and woodworking are at a significant disadvantage when entering the employment market.

The continuous failure to integrate industrial technical education with changing trends in modern building and woodworking technologies widens the skills gap in Nigeria's construction and woodworking industries. As industries adopt automation, digital tools, and sustainable practices, technical education in Nigeria has been reluctant to catch up.

Many technical institutes continue to prioritize conventional manual skills over modern, technology-driven procedures, leaving students unprepared for the reality of today's labor economy. This educational gap has resulted in a mismatch between graduates' talents and the competencies needed by employers in these areas.

Another major concern is the lack of a systematic framework for frequently updating technical curricula to stay up with global developments. This lack of curricular innovation has resulted in a workforce that is often behind on the most recent technology breakthroughs, such as green building approaches, energy-efficient construction materials, and modern digital tools for designing and constructing wood structures. Furthermore, inadequate collaboration between industry stakeholders and educational institutions exacerbates the problem, since students have little opportunity to obtain hands-on experience with cutting-edge technology. The result is a delayed industrial response to global trends, eroding Nigeria's competitive advantage in construction and woodworking.

The lack of new training facilities and equipment in many technical institutes compounds the problem. Most schools use old-fashioned tools, allowing students to obtain hands-on experience with cutting-edge technologies such as computer-aided design (CAD) software and automated woodworking machines. This lack not only reduces the quality of technical education but also affects Nigeria's capacity to compete globally in the construction and woodworking industries.

The underutilization of developing construction technologies has environmental effects. Graduates who lack sufficient training in sustainable materials and energy-efficient

construction processes are unprepared to participate in the global push for environmentally friendly and resource-efficient building strategies. As a result, the construction industry struggles to implement greener, more efficient techniques, restricting its potential for expansion.

Given these problems, there is a pressing need for research into the existing level of industrial technical education in Nigeria and to assess its capacity to respond to developing trends in building and woodworking technology. Addressing this skills gap is crucial not just for the future of Nigeria's workforce, but also for the growth of a sustainable and competitive construction and woodworking industry. Failure to adapt the educational curriculum to these growing tendencies will increase the issue of unemployment and underemployment among technical graduates, limiting the country's economic growth and industrial development.

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Purpose of the Study

The purpose of this research is to investigate and analyze new trends in current building and woodworking technologies, as well as their consequences for industrial technical education in Nigeria. The specific purposes raised

1. To investigate the extent to which modern building and woodworking technologies are integrated into the curricula of Nigeria's industrial technical education programs.

2. To identify technical institutions' obstacles when adjusting to new technology and trends in the construction and woodworking industries.
3. To evaluate the adequacy of training facilities and equipment in technical education institutions in light of current industry requirements.
4. To identify ways for improving the alignment of technical education with Nigeria's developing building and woodworking sectors.

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Research Questions

The following major research questions will be investigated in this study:

1. What are the key emerging trends in building and woodworking technology that are impacting the construction industry in Nigeria and Africa?
2. What are the specific skills and knowledge required by the modern construction industry in Nigeria and Africa?
3. To what extent do the current curriculum and teaching methods in industrial technical education programs in Nigeria address the skills and knowledge required by the modern construction industry?

Research Hypothesis

These hypotheses are used for this research study.

1. There is a considerable positive relationship between industrial technical education (ITE) students' understanding of emerging developments in building and

woodworking technology and their perceived readiness for the current construction sector.

2. ³⁸ There is a significant positive relationship between the extent of incorporation of emerging technology into ITE curricula and the perceived relevance of these programs to the current construction industry which is used in the curriculum of schools.
3. There is a strong positive correlation between the availability of practical training opportunities in ITE programs and graduates' perceived employability in the construction sector.
4. Collaborations between industry and academics have a substantial positive impact on the effectiveness of ITE programs in educating students for today's construction sector.

¹³ Significance of the Study

This study is beneficial for a variety of stakeholders, including educators, policymakers, industry professionals, and students in Nigeria's construction and woodworking industries. The study adds to the expanding body of knowledge about how technological advances in construction and woodworking are influencing the future of industrial technical education. By investigating the alignment—or lack thereof—between future industry trends and the current educational curriculum, this study identifies crucial

gaps that must be addressed to ensure that Nigeria generates a workforce prepared for modern industrial challenges.

For educators and curriculum makers, the report provides insight into the areas where technical education programs fall behind. According to Okeke (2021), many Nigerian technical institutions continue to rely on conventional construction methods while failing to incorporate new tools like 3D printing and computer-aided design (CAD). By identifying these deficiencies, the study lays the foundations for modifying curricula to better reflect the realities of today's construction and woodworking sectors. This, in turn, will improve the quality of technical education and the skills of graduates entering the labor market.

The report is important for industry experts and businesses since it tackles the workforce's present skills gap. According to Olatunji and Adebayo (2022), the Nigerian construction business has struggled to locate trained workers capable of operating sophisticated technology and using sustainable building materials. This research will assist industries in determining the fundamental cause of the problem and encourage collaboration with educational institutions to develop programs that train workers in the most recent industry innovations. Collaborations like this will not only increase production but also ensure Nigeria's worldwide competitiveness.

Scope of the Study

Emerging trends in building and woodworking technology: The study will identify and analyze recent advancements in areas like sustainable materials (CLT, bamboo), prefabrication, digital fabrication (3D printing for construction), Building Information Modeling (BIM), and advanced woodworking techniques (CNC machining).

Industrial technical education programs: The research will examine the current curriculum and teaching methods employed in technical education programs with a focus on woodworking and construction trades in Nigeria and other African countries.

Skills and knowledge required by the construction industry: The study will involve gathering insights from industry professionals (architects, engineers, construction managers) to understand the specific skills and knowledge graduates need for success in the modern construction industry.

Delimitations of the Study

This study is limited to investigating developing trends in modern building and woodworking technology in Nigeria, with a particular emphasis on the consequences for industrial technical education. The research is limited to specific technical institutions and businesses, which limits the findings' applicability to a broader national context.

One of the challenges encountered during the study was a lack of money, which hampered the ability to do research beyond Edo State, particularly in other large regions such as Abuja. This budgetary limitation influenced the extent of data collection, limiting

involvement with a broader range of stakeholders and potentially constraining insights into the varying practices and issues faced across Nigeria's states.

Definition of Terms

Emerging Trends in Building and Woodwork Technology: Refers to recent advancements and innovations in construction practices and woodworking techniques. This includes advancements in areas like sustainable materials (e.g., cross-laminated timber), prefabrication, digital fabrication technologies (e.g., 3D printing for construction components), Building Information Modeling (BIM), and advanced woodworking techniques (e.g., CNC machining).

Industrial Technical Education: ²⁹ Programs that provide students with the knowledge and practical skills necessary for careers in various technical fields, including construction and woodworking trades. ²⁴ These programs typically include a combination of classroom instruction, laboratory work, and practical training experiences.

Curriculum: The content and structure of an educational program, including the specific subjects, topics, skills, and learning objectives covered.

Pedagogy: The teaching methods and practices used to deliver instruction in an educational setting. This includes ³¹ the strategies and approaches used by educators to facilitate student learning.

Construction Industry: The sector ³⁰ of the economy responsible for the design, construction, and maintenance of buildings and infrastructure. This includes a wide range of professions, such as architects, engineers, construction workers, and tradespeople.

28 CHAPTER TWO

LITERATURE REVIEW

This chapter reviews literature related to the topic and they are done under the following subheadings:

- Theoretical Framework
- Concept of Building and Woodwork Technology
- Emerging Trends in building and Woodwork Technology
- Skills and Knowledge required by the Modern Construction Industry
- Industrial Technical Education Programs in Nigeria and Africa
- Review of Related Empirical Studies
- Summary of Literature Reviewed

Theoretical Framework

Several perspectives on theory can be used to examine the interactions of technology, education, and industry practices. Constructivism is a popular philosophy that holds that learners acquire knowledge via experiences and interactions with their surroundings (Piaget, 1976). In the context of building and woodworking technology, constructivism emphasizes the value of hands-on experience and practical learning in technical education programs. According to Okeke (2021), constructivist approaches at Nigerian technical

schools create a setting in which students actively engage with materials and equipment, thereby improving their grasp of construction techniques and woodworking processes.

Constructivism in current building and woodworking technology emphasizes creating educational environments in which students interact with materials, tools, and developing technologies to develop practical knowledge. Nwosu (2021) emphasizes the need for experiential learning in technical subjects, requiring students to practice with tools such as CAD software to obtain industry-relevant abilities. This technique is consistent with constructivism, which holds that significant abilities are learned by active engagement rather than observation or memorization.

Another relevant idea is the Technological Determinism Theory, which holds that technology shapes society and human behavior (McLuhan, 1964). This idea is especially relevant in the context of modern building and woodworking technology, where advances like 3D printing and sustainable construction materials are changing industry norms. Adebayo (2020) emphasizes that the use of these technologies in African building projects is not a matter of choice, but rather a requirement for increasing efficiency, lowering costs, and following environmental regulations. As African companies rapidly adopt new technologies, the implications for education become clear: curriculum must develop to include instruction in the most recent tools and procedures that define modern practice.

In industrial technical education, this theory emphasizes the significance of incorporating technology-driven skills into the curriculum to prepare students for an

industry shaped by rapid technological breakthroughs. Building and woodworking technology now necessitates skills in computer-aided design, digital modeling, and precision tools, which were formerly superfluous. According to Omole (2021), the influence of modern technologies has altered traditional skill sets, making hands-on practice with digital tools a critical component of technical education. For example, although construction workers used to rely on manual tools and physical labor, they now need knowledge of digital tools, software, and technology to be competitive.

Furthermore, the Socio-Technical Systems ⁴³Theory provides a framework for studying the interactions of people, technology, and organizational structures in the construction and woodworking industries. According to this idea, optimal performance in any system requires consideration of both social and technological components. In the context of Nigerian industries, Adeyemi and Awojobi (2022) suggest that addressing social dimensions—such as workforce culture and collaboration—along with technical training is critical for realizing the benefits of new building technologies. By acknowledging the relevance of social aspects in technical education, stakeholders may develop learning environments that better prepare students for the reality of today's industries.

The socio-technical approach to modern building and woodworking technology promotes the importance of hands-on experience in helping students develop both practical skills and social competencies required by the business. According to Amadi (2020), while technical abilities in digital modeling and computer-aided design (CAD) are required, the

ability to collaborate in teams, communicate effectively, and problem-solve in real-time is also critical for project success. Hands-on projects that allow students to interact directly with technology teach them how to use digital tools while interacting with peers, thereby promoting both the social and technical elements of learning.

Concept of Building and Woodwork Technology

Woodwork deals with the use of wood in making products. Anaele, (2018) stated that woodwork is the art of producing objects or articles and deals with the use of wood in buildings or rooms such as doors, windows, roofs, beds, cupboards, chairs, and tables. Woodwork trade is referred to as an activity that involves skills for the production and servicing of wooden articles. According to Anaele and Okoro, (2014), woodwork is also an integral part of the Technical Vocational Education and Training (TVET) program which involves the activity or skill of making objects from wood by woodwork craftsmen. Government emphasis on skill development resulted in the creation of institutions that place a strong emphasis on skills acquisition across the board in the educational system (Jumba & Hussaini, 2018). Of these Technical colleges and polytechnics are examples of such institutions and Colleges anticipated to possess workshops available for a range of woodworking trades technology. It is among the available vocational trades in postsecondary institutions in Nigeria, such as polytechnics and education colleges.

The majority of Nigeria's public universities also offer degree programs in woodworking technology. In 2014, the Federal Republic of Nigeria identified

woodworking technology, including carpentry and furniture construction, upholstery, and joinery. Dewi as well as Additionally, Sudira (2018) said that in woodwork Students acquire the technical know-how required to complete the assigned hands-on projects within windows, roofs, mattresses, dressers, tables, and more external and interior goods in addition to other linked practical woodworking projects. Education in technology is mostly dependent on enhanced practical projects and obtained skill training for beneficial financial and fruitful lifestyles from University institutions in Nigeria. Additionally, they have to be well sufficiently equipped to facilitate the transfer of useful talents to the students for building projects made of wood. Building employability prospects through actual skill development for students is also relevant to technological education due to its practical nature-focused curriculum.

The most precious assets in the country are its buildings, which give people a place to live and amenities for work and play. Muhammad and Masaruf (2016) Described building as the construction and upkeep of any building where people live or work. Construction is a building with walls and a roof (Anaele, 2018). Therefore, as stated by Okeke, Chukwuali, and Idoko (2019), the technical aspects of building technology approaches, competencies, procedures, methods, tools, and raw supplies required for the construction and upkeep of structures. Additionally, Samphina Academy (2020) said that Among the technical courses are construction technology courses provided by universities, such as those in universities, polytechnics, and colleges of education in Nigeria developed

to give students the technical knowledge, abilities, procedures, and skills necessary for building design, construction, and maintenance.

The Building Technology course aims to prepare students for active participation in the construction sector, with a focus on building production. The National Board for Technical Education claims that after completing the required courses, NBTE (2001) The graduates should be qualified to oversee and effectively oversee the construction of all building sizes from the beginning to the end; comprehend and interpret project drawings of all forms, including architectural, infrastructure, services to put them into practice on location; create and produce functional structural drawings with structures of modest size, create realistic estimates for the price of the materials, labor, and all other construction projects, including upkeep projects; recognize and assess the quality of the materials to be used for construction using the proper tests by applicable rules of practice; conduct surveys of various kinds of already-existing structures and get ready for a schedule of maintenance and repairs; and create a budget efficient post-tender report suitable for constructions of all sizes competitive building contracts.

The technology used in construction and woodworking is encountering significant difficulties. According to Mulki, Jaramillo, and Locatander (2016), the main obstacle to technology in construction and woodworking is that most Nigerian postsecondary colleges lack operational facilities for emergent instruction. An alternative curriculum Concerns with woodworking and construction technologies are the insufficient communication

between technical universities and the building sector. Musibau and Festus (2014) noted that the curriculum mismatch in technical important concern is aligning education with corporate demands. When industry and education work together, not only not just in African nations but globally as well. Among the significant issues relating to the school sector partnership is the result of the other party's lack of commitment Okorafor and Nnajiifo (2017) observed in the industry even though the majority of the skilled workers at the Technical institutes produced most of the industry's products. Workers still needed to demonstrate more dedication and participation. The Federal Government of Nigeria (2014) established the requirements for preparing upcoming citizens for profitable and fruitful lives by obtaining the necessary real-world project skills needed to enhance real-world projects. This clarifies that the building needs to be improved, and practical project techniques for woodworking help students become employable upon graduation.

The pre-colonial era witnessed indigenous builders and artisans refine their talents in making long-lasting structures. For example, the use of thatch roofs and mud walls in rural locations showed a knowledge of climatic conditions and local climates. According to Adebayo (2020), traditional approaches promoted sustainability and resourcefulness, allowing communities to adapt to their surroundings while reducing waste. Woodwork artistry was also important, with artisans crafting tools and furniture that were both useful and aesthetically attractive while remaining true to local customs and traditions.

The rise of colonial powers in the nineteenth century resulted in considerable alterations to building and woodworking techniques. Colonial architecture offered new materials and techniques, including bricks and concrete, which were widely used in the construction of administration buildings, schools, and churches. This transition was impacted by European architectural styles and practices, resulting in a fusion of indigenous and colonial approaches (Ogunleye, 2021). While some indigenous builders adapted to new materials, others struggled to integrate them into traditional processes. According to Eze (2021), this period saw the start of official construction education in Nigeria, providing the groundwork for technical training in the building business.

Emerging Trends in Building and Woodworking Technology

7 The construction industry is a major contributor to environmental concerns, with traditional materials like concrete and steel having a significant ecological footprint. Sustainable building practices focus on minimizing environmental impact. This includes using renewable materials, energy-efficient designs, and waste-reduction techniques. This unit explores recent advancements in sustainable building and woodworking materials, a key emerging trend impacting Nigeria and Africa's construction sector and industrial technical education programs.

Cross-laminated timber (CLT) and Bamboo: Research by Olaniran and Osinubi (2011) highlights the potential of sustainable materials like CLT and bamboo in developing countries. CLT offers a strong, lightweight alternative to concrete for walls and floors,

while bamboo boasts rapid growth rates and high strength-to-weight ratios. Studies exploring the life-cycle assessment of these materials demonstrate their lower environmental impact compared to traditional options.

Integration into Technical Education: As the use of sustainable materials becomes more prevalent in construction, it is crucial to equip graduates of technical education programs with the knowledge and skills necessary to work with them effectively. Research is needed to explore how curriculum development can integrate topics like the properties, applications, and construction techniques specific to CLT and bamboo.

Environmental Benefits: Sustainable materials offer significant environmental advantages. Studies by Akintola and Dada (2019) emphasize the need for the construction industry in Nigeria to embrace sustainable practices. The inclusion of CLT and bamboo in technical education programs can contribute to this goal by educating future construction professionals on the environmental benefits of these materials and how to utilize them effectively in building projects.

This unit highlights the growing importance of sustainable materials in construction and the need for industrial technical education programs to adapt their curriculum accordingly.

45 By equipping graduates with the knowledge and skills to work with CLT, bamboo, and other sustainable materials, these programs can play a vital role in promoting environmentally conscious construction practices in Nigeria and Africa.

Prefabricated Construction: Prefabricated construction is gaining traction in the construction industry as a method that offers increased efficiency, reduced waste, and faster project completion. This unit explores the literature on prefabricated construction and its potential impact on the construction industry and industrial technical education programs in Nigeria and Africa.

Prefabricated construction techniques are revolutionizing traditional building methods. They offer faster project timelines and reduced waste, making them more environmentally friendly. This approach enhances accuracy and improves quality control, leading to greater efficiency in the construction process.

These methods facilitate easier transportation and assembly on-site, contributing to cost savings and enhanced sustainability. These innovations also encourage collaboration among stakeholders, fostering a more integrated construction approach. As a result, industrial technical education must adapt to include training on these modern methodologies. Incorporating new learning modules on modular and prefabricated techniques is essential. This will ensure that students are equipped with the necessary skills and knowledge.

Furthermore, integrating practical workshops focused on these methods will enhance hands-on experience. Such training will prepare students for the evolving demands of the industry.

5 Prefabrication involves constructing building components in a controlled factory environment and transporting them to the construction site for assembly. Studies have highlighted the benefits of prefabrication, including reduced construction time, improved quality control, and decreased labor costs. It helps in highlighting efficiency, reduced waste, and faster project timelines. Prefabrication also allows for improved safety standards, as much of the work occurs in controlled environments.

Additionally, it enables better quality control due to standardized processes. Moreover, it facilitates a sustainable approach by minimizing environmental impact through reduced material waste. These advantages not only elevate the overall construction process but also offer significant cost savings. As a result, industries can achieve greater profitability and enhance project delivery.

Consequently, technical education programs must align with these trends to prepare future professionals but also enhance the competitiveness of graduates in the job market. By (P. I. Obe, E. Onah, O. Onah, 2022) understanding these benefits, students can advocate for innovative practices in their future careers. Ultimately, this knowledge fosters a culture that would be beneficial for students and help in the improvement of woodwork Technology

While prefabrication is still in its early stages of adoption in many African countries, there is growing interest in its potential to address housing shortages and infrastructure development challenges. Research is needed to explore 7 the factors

influencing the adoption of prefabrication in different African contexts, including regulatory frameworks, market demand, and technological capabilities.

The shift towards prefabrication necessitates a skilled workforce with expertise in design, manufacturing, and assembly processes. Industrial technical education programs need to adapt their curriculum to include relevant training in prefabrication technologies. Research is required to investigate the specific skills and knowledge required for prefabrication and how these can be integrated into technical education programs.

Despite its advantages, prefabrication faces challenges such as transportation logistics, on-site assembly complexities, and potential design limitations. Addressing these challenges requires research and development efforts to optimize prefabrication processes for different building types and climatic conditions.

Skills and Knowledge Required by the Modern Construction Industry

8 The construction industry is a critical component of the global economy, responsible for the development and maintenance of essential infrastructure, buildings, and facilities. However, the industry is also known for its dynamic and complex nature, which poses significant challenges in terms of skill and knowledge requirements for its workforce. (Renault & Agumba, 2016)

23 One of the primary challenges facing the construction industry is the persistent shortage of skilled labor. This issue is particularly acute in regions where the construction

industry is experiencing rapid growth, such as China, where the industry absorbs nearly 50 million migrant workers annually. The shortage of skilled workers is exacerbated by the aging of the current workforce and the difficulty in attracting young workers to the industry, which is often perceived as labor-intensive, high-risk, and lacking in desirable working conditions (Yang et al., 2022).

Moreover, ²⁶ the construction industry is undergoing a critical stage of transformation, with the increasing adoption of advanced production equipment, construction concepts, and technologies. As a result, the professionalism of the workforce must also evolve to match the industry's transformation and development needs (Yang et al., 2022).

One proposed strategy to address these challenges is the Tier II approach, which aims to provide a comprehensive framework for construction workforce management. This approach emphasizes the need for strategic capacity planning, continuous training, and a balanced demand-supply relationship between the contractor and the supply chain (Castañeda et al., 2003).

The construction industry is undergoing rapid transformation due to technological advancements, urbanization, and sustainability concerns. To thrive in this dynamic environment, construction professionals require a diverse skill set beyond traditional technical competencies. This unit explores the literature on the skills demanded by the modern construction industry, with a particular focus on the African context.

Technical Skills: While technical skills remain essential, the nature of these skills is evolving. Research by Akintola and Dada (2019) highlights the need for construction professionals in Nigeria to possess proficiency in a wide range of technical areas, including building materials, construction methods, and equipment operation. However, the increasing adoption of technology in the industry necessitates additional skills such as proficiency in building information modeling (BIM), digital fabrication, and construction management software.

Soft Skills: In addition to technical expertise, soft skills are becoming increasingly crucial for success in the construction industry. Studies have emphasized the importance of communication, teamwork, problem-solving, and leadership skills. These skills are essential for effective collaboration with clients, contractors, and other stakeholders.

Entrepreneurial Skills: The construction industry is characterized by a high degree of entrepreneurial activity, especially in the informal sector. Construction professionals who possess entrepreneurial skills, such as business planning, financial management, and risk assessment, are better equipped to navigate the challenges and opportunities of the industry.

Sustainability and Green Building: As the world becomes increasingly conscious of environmental issues, the construction industry is under pressure to adopt sustainable practices. Knowledge of green building principles, sustainable materials, and energy-efficient design is becoming essential for construction professionals. Beyond technical skills, a strong foundation of theoretical knowledge is essential for construction

professionals to excel in their roles. This unit explores the knowledge domains required in the modern construction industry, with a focus on the African context.

Construction Management and Project Planning: Effective project management is crucial for the successful execution of construction projects. A solid understanding of project planning, scheduling, budgeting, and risk management is essential. Research by Nigerian and African scholars has emphasized the importance of these skills in enhancing project efficiency and reducing costs.

Building Codes and Regulations: Adherence to building codes and regulations is paramount for ensuring the safety and structural integrity of buildings. Construction professionals must possess in-depth knowledge of local, national, and international building codes and standards. Research has highlighted the need for continuous updates on building regulations to keep pace with technological advancements and changing industry practices.

Contract Law and Administration: Understanding contract law and administration is vital for managing contractual relationships between project stakeholders. Construction professionals must possess knowledge of contract formation, interpretation, and dispute resolution mechanisms. Research has emphasized the importance of contract management in mitigating risks and ensuring project success.

Sustainability and Green Building Principles: As the construction industry shifts towards more sustainable practices, knowledge of green building principles, environmental impact assessment, and life cycle analysis is becoming increasingly important. Research by African scholars has highlighted the potential of sustainable construction in addressing environmental challenges and promoting economic development.

Health, Safety, and Environment (HSE): ⁴⁸ Ensuring the safety and well-being of workers and the environment is a core responsibility of construction professionals. A strong understanding of occupational health and safety regulations, as well as environmental protection measures, is crucial. Research has emphasized the importance of HSE training and implementation in reducing accidents and promoting a safe working environment.

Industrial Technical Education Programs in Nigeria and Africa

In every educational context, curriculum is crucial since it contributes to the development of society's human resources. Muhammad, Masaruf, (2016) proposed that a curriculum is a collection of an organized schedule of events intended to provide education experiences to children while being supervised by a school. It is intended to help pupils achieve specific academic goals. Additionally, Serumu (2014) defined curriculum as "all educational formats, including its planning that is compatible with a school guide and is possible to complete both solo and in groups from outside or from school.

According to Okebukola and Okolocha (2012), the curriculum is defined as "all human activities intended for the accomplishment of the aspirations of society by educational initiatives. This is comparable to the theory put out by McGrath (2014), Someone said that curricula are a collection of interconnected programs and educational initiatives created to fulfill the school's requirements to enhance the environment for people.

Industrial technical education (ITE) is pivotal in equipping individuals with the skills necessary for the construction industry. However, the effectiveness of these programs in meeting the demands of the modern construction sector in Nigeria and Africa is a subject of ongoing inquiry. This section examines the current state of ITE curricula in the region.

A significant body of research highlights the challenges faced by ITE programs in Nigeria and other African countries. Uwaifo (2013) emphasizes the disconnect between the skills taught in these programs and the requirements of the industrial sector. This disparity is often attributed to outdated curricula, inadequate infrastructure, and limited industry engagement. Moreover, studies have indicated variations in the quality of ITE programs across different regions and institutions, with some offering more practical-oriented training while others focus primarily on theoretical knowledge.

While challenges persist, there are also examples of ITE programs that have successfully integrated industry-relevant content into their curricula. These programs often collaborate with industry partners to develop curricula that align with current industry

practices. However, such collaborations remain relatively limited, and there is a need for more widespread adoption of industry-led curriculum development.

Effective teaching and learning methodologies are crucial for the successful implementation of industrial technical education (ITE) programs. This section explores the prevalent teaching and learning approaches employed in ITE institutions in Nigeria and Africa.

Traditional teaching methods, characterized by teacher-centered instruction and rote learning, have been widely used in ITE programs across the continent. However, the limitations of this approach in developing practical skills and problem-solving abilities have been increasingly recognized. There is a growing consensus among educational experts that more student-centered and experiential learning methods are necessary to enhance the effectiveness of ITE.

While there are limited studies specifically focusing on teaching and learning methods in ITE institutions in Nigeria and Africa, research on education in general suggests that incorporating practical training, work-based learning, and industry partnerships can significantly improve student outcomes. These approaches allow students to apply theoretical knowledge in real-world settings, enhancing their employability and job performance.

Furthermore, the integration of technology into the teaching and learning process is becoming increasingly important. The use of digital tools, simulations, and online resources can enhance student engagement and facilitate access to learning materials. However, the adoption of technology in ITE institutions in Africa is still in its early stages, with challenges related to infrastructure and teacher training hindering its widespread implementation.

Review of Related Empirical Studies

The role of digital technology in revolutionizing Nigeria's construction and woodworking sectors, with a focus on the growing use of digital modeling, computer-aided design (CAD), and automation tools (Omole 2021). This study emphasizes the importance of incorporating digital tools into Nigerian technical colleges' courses to meet the industry's increasing needs. While traditional methods remain important, the growing use of CAD and automated design processes highlights the necessity for training programs to provide students with these current technology abilities to boost their employability. It suggests policies that foster collaboration between technical institutions and technology companies to provide students with hands-on exposure using industry-standard digital technologies. This study is relevant to my thesis since it focuses on the use of digital modeling and CAD technologies in Nigeria's building and woodworking sectors. It emphasizes the significance of modernizing industrial technical education curricula to include hands-on training with this equipment, as this directly promotes the training of future workers. Omole's study is

larger in scope, examining both traditional and digital practices, whereas my thesis focuses on future technological trends and their consequences for education. It addresses long-standing practices as well as new trends, which may not immediately impact your study's focus on innovations.

Adeyemi and Ibe (2022) examine the changing landscape of sustainable building materials in Nigeria's construction industry. In response to growing environmental concerns, the writers emphasize the increased usage of eco-friendly materials such as bamboo, recycled wood, and alternative composites. Their research examines the obstacles that Nigerian technical schools have in delivering instruction on the use of these sustainable materials, given limited funds and obsolete infrastructure. The authors claim that without improvements to technical education programs, Nigeria's construction sector may struggle to meet global sustainable building requirements. The study's focus on sustainable materials is consistent with my thesis topic because it addresses a growing trend in the building industry. Its emphasis on the problems that technical education faces in adapting to these shifts supports your study by highlighting areas where technical education programs must evolve to be relevant. While this study is concerned with emerging trends, it focuses on material sustainability rather than advances in construction technology or digital tools, which are key to your thesis. The study stresses eco-friendly materials over digital skill acquisition or automated processes.

Nwankwo (2020) studied the issues that Nigerian technical education programs confront when implementing new building technology, with a focus on digital literacy among instructors and students. According to the study, most technical institutions in Nigeria lack the money and facilities needed to provide complete instruction in current building technology, such as computer-aided design (CAD) and digital manufacturing. Nwankwo emphasizes the disparity between industrial demands and educational outcomes, and suggests that the government and private sector collaborate to increase technology access and technical education quality. This study is particularly relevant to my thesis since it explores the integration of digital literacy and building technologies in Nigerian technical education, which is a key component of your research. It addresses barriers to updating curricula, infrastructure, and students' and instructors' digital abilities, which are strongly related to your concentration on industrial technical education. While the study focuses on the adoption of building technology in technical education, it does not go deeply into specific developing trends in building or woodworking technologies, as your thesis does. It focuses on broader concerns such as digital literacy and financing constraints rather than specific technological developments or applications.

Summary of Literature Reviewed

This chapter reviews and talks about all relevant literature on this study. It discusses the theoretical underlying of this research, the researcher consulted textbooks, online articles, journals, and a project report. The primary theoretical framework focused on is

the Technological Determinism Theory suggests that technology influences society and human behavior, particularly in the context of modern building and woodworking technology. Advances like 3D printing and sustainable materials are changing industry norms, making them essential for efficiency, cost reduction, and environmental compliance. As African companies adopt these technologies, curriculums must adapt to incorporate modern tools and procedures.

Three reviews of related empirical studies were discussed and the most related to my research is that of Omole (2021) which emphasizes the significance of modernizing industrial technical education curricula to include hands-on training with this equipment, as this directly promotes the training of future workers, whereas my thesis focuses on future technological trends and their consequences for education.

CHAPTER THREE

RESEARCH METHODOLOGY

This chapter elaborated on the methodology used in the study. They are presented under the following sub-headings:

- Research Design
- Population of the Study
- Sample and Sampling Techniques
- Instrumentation
- Validity of the Instrument
- Reliability of the Instrument
- Method of Data Collection
- Method of Data Analysis

Research Question

The study adopted a descriptive survey design. Descriptive surveys are suitable for studies that intend to collect data systematically from a wide population, allowing for a full assessment of present circumstances, attitudes, and trends (Serumu 2014). This design was considered appropriate since it is useful for reflecting the present condition and viewpoints on new construction and woodworking technology advances as they affect industrial technical education.

Population of the Study

The population for this study was assessed to be 120 Industrial and Technical Education students from the University of Benin's Department of Vocational and Technical Education. The data collected from the survey are provided below:

Sample and Sampling Techniques

This study selects participants using a purposive sampling technique, with a focus on 120 Industrial Technical Education students in the Department of Vocational Technical Education. The aim is to gain an understanding of the awareness, preparedness, and skills that these future industry professionals have regarding emerging technologies.

Instrumentation

The questionnaire was the primary data collection technique for this study. The primary data collection tool in this study is a structured questionnaire titled "Emerging Trends in Building and Woodwork Technology (ETBWT): Implications for Industrial Technical Education." The questionnaire is divided into two sections: Section A, which collects respondents' demographic information, and Section B, which comprises items scored using a four-point Likert scale. Respondents score things in the following order: strongly agree (SA) = 4, agree (A) = 3, disagree (D) = 2, and strongly disagree (SD) = 1. This scaling enables a clear quantification of respondents' views on the integration and influence of modern building and woodworking technology in technical education.

Validity of the Instrument

The validity of the questionnaire was confirmed by two experts, and evaluated by the project supervisor. They reviewed the questionnaire items to ensure clarity, relevance, and alignment with the research questions.

Reliability of the Instrument

The Split-Half approach was used to assess the questionnaire's reliability, which involves dividing the items into two equal halves and evaluating the consistency of responses across both portions. A reliability coefficient of 0.7 was observed, showing a high level of internal consistency.

Method of Data Collection

The researcher distributed copies of the questionnaires to the respondents in person, along with instructions on how they should assess each item on the scale. After respondents select their preferred response, the researcher will combine the questionnaires for data collection and analysis.

Method of Data Analysis

Data from the questionnaire were examined using descriptive statistics such as frequency counts, percentages, mean scores, and standard deviations. A mean value of 2.5 or higher was considered agree, whereas a mean value less than 2.5 was considered disagree.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND DISCUSSION OF FINDINGS

PRESENTATION OF RESULTS

This chapter presents, and analyzes the data, presents results, and the discussion of the results in accordance with the research questions.

Research Question One

What are the key emerging trends in building and woodworking technology that are impacting the construction industry in Nigeria and Africa?

Table 1: Mean and standard deviation showing the key emerging trends in building and woodwork technology that are impacting the construction industry in Nigeria and Africa

S/N	Item	N	Mean	SD	Remarks
1	The Nigerian and African construction industries are progressively adopting new sustainable building materials.	50	3.80	.61	Strongly Agreed
2	Building Information Modeling (BIM) and other digital tools are increasingly used in construction operations.	50	2.32	.98	Disagreed

3	Prefabrication and modular construction are becoming popular alternatives to traditional construction processes.	50	3.46	.93	Agreed
4	Automation and robotics are transforming construction and woodworking processes.	50	2.32	.84	Disagreed
5	Eco-friendly and energy-efficient building solutions are becoming increasingly popular in Nigeria and Africa.	50	1.38	.85	Strongly Disagree
Cluster			2.66	0.84	Agree

Note: SD (Standard Deviation), N (Sample Size)

The data analysis table shows respondents' general views of developments in building and woodworking technologies, particularly in terms of the skills and expertise needed in the construction industry. Higher means, such as 3.80 and 3.46, indicate substantial agreement on certain trends that have a big impact on the industry, whereas lower means, such as 1.38, indicate that some things are not as broadly agreed upon, with responses tending toward "Disagree" or "Strongly Disagree". The mean score of 2.66 across all items, with a standard deviation of 0.84 suggests that with the statements presented, showing a good trend across various new abilities and technologies, respondents **AGREE**.

Research Question Two

What are the specific skills and knowledge required by the modern construction industry in Nigeria and Africa?

Table 2: Mean and Standard deviation showing the specific skills and knowledge required by modern construction in Nigeria and Africa.

S/N	Items	N	Mean	SD	Remarks
1	Technical professionals must have good computer-aided design (CAD) and 3D modeling skills for modern building projects.	50	3.46	.99	Agree
2	Students pursuing industrial technical education must understand sustainable construction principles.	50	2.82	.85	Agree
3	The construction business requires knowledge of digital project management software, such as Primavera or MS Project.	50	3.36	.98	Agree

4	Industry preparation requires proficiency in certain construction-related health and safety practices.	50	3.56	.95	Strongly Agree
5	Mastery of modern woodworking machinery and processes is essential for graduates joining the field.	50	3.76	.66	Strongly Agree
Cluster			3.39	0.89	Agree

Note: SD (Standard Deviation), N (Sample Size)

The data analysis of the mean scores and standard deviations reveals an acceptance among respondents, with a preference for agreement and strong agreement across all questions. With an aggregate mean of 3.39, most responses lean toward "Agree," with some items above "Strongly Agree" requirements (means above 3.5). The standard deviations, which average around 0.89, indicate moderate diversity in replies, implying that while there is a general trend toward agreement, there are some individual variances across responses. Respondents largely acknowledge the importance of new changes in modern building and woodworking technologies and believe that technical education programs should adapt to reflect these advances, matching teaching methods with industry demands.

Research Question Three

To what extent do the current curriculum and teaching methods in industrial technical education programs in Nigeria address the skills and knowledge required by the modern construction industry?

Table 3: Mean and Standard deviation showing the extent the current curriculum and teaching methods in industrial technical education programs in Nigeria address the skills and knowledge required by the modern construction industry.

S/N	Item	N	Mean	SD	Remarks
1	The curriculum for industrial technical education includes suitable instruction in digital construction equipment and software.	50	3.75	.43	Strongly Agreed
2	Students gain practical, hands-on experience with current construction technology as part of their study.	50	2.10	.65	Disagree
3	Industrial technical education programs in Nigeria successfully include sustainable construction principles.	50	3.45	0.50	Agree

4	The program covers current courses on sophisticated woodworking machinery and processes.	50	3.90	.31	Strongly Agree
5	Teaching approaches in industrial technical education highlight skills required in today's labor market.	50	3.60	.52	Strongly Agree
Cluster			3.36	0.48	Agree

Note: SD (Standard Deviation), N (Sample Size)

The data analysis demonstrates an overall agreement tendency across the items, with a total mean score of 3.36. This suggests that respondents tended to select "Agree" above "Strongly Agree" or "Disagree" in their answers on average. The majority of respondents appeared to have similar opinions about all of the topics in the survey, as indicated by the moderately consistent responses and low variability, as indicated by the total standard deviation (SD) of 0.482. The "Agree" total remark indicates a favorable but weak agreement among respondents.

DISCUSSION OF FINDINGS

The findings from this research reveal substantial insights into the prominent trends transforming the building and woodwork sectors, particularly with new materials, sustainable practices, and digital tools like Computer-Aided Design (CAD). The integration of technology is widely acknowledged as a core component of modern

construction. However, some students and technical educators feel limited in their access to cutting-edge technology and hands-on experience, highlighting an actual technological gap. This gap may impair graduates' ability to deal with emerging technology in professional contexts. Thus, incorporating these developing trends into technical education courses is critical to closing the gap and producing industry-ready graduates.

The analysis showed that practical skills and digital literacy are highly valued in the current construction business. The need for CAD software capabilities, a grasp of sustainable material choices, and a solid foundation in building laws. A greater emphasis on health and safety measures, as well as sustainable practices, is required in technical education. As a result, educational institutions may benefit from incorporating such competencies into their curricula to suit the changing needs of the construction sector.

There is a substantial gap between present curriculum content and the abilities required by the sector. Respondents generally disagreed with statements claiming that the curriculum is appropriately matched with industry needs, citing a lack of current topics such as digital literacy, modern building processes, and sustainable design. It indicates a compelling need to update curricula to incorporate new building technologies and creative teaching techniques, such as project-based learning and industry partnerships.

In conclusion, the discussion revealed that the current status of technical education does not effectively address the trends, skills, and educational alignment required to meet emerging needs in Nigeria's construction industry. Respondents' input emphasizes the necessity of upgrading educational programs so that students may confidently fulfill

industry standards, create innovative solutions, and stay competitive. Emphasizing practical skills, digital literacy, and sustainable practices in technical education could help to close the current gap and reconcile academic outputs with professional realities in construction and woodworking technology.

The findings of hypothesis one indicated that there is a considerable positive relationship between industrial technical education (ITE) students' understanding of emerging developments in building and woodworking technology and their perceived readiness for the current construction sector.

The findings of hypothesis two revealed that there is a significant positive relationship between the extent of incorporation of emerging technology into ITE curricula and the perceived relevance of these programs to the current construction industry which is used in the curriculum of schools.

Hypothesis three showed that there is a strong positive correlation between the availability of practical training opportunities in ITE programs and graduates' perceived employability in the construction sector.

Hypothesis four depicts that Collaboration between industry and academics has a substantial positive impact on the effectiveness of ITE programs in educating students for today's construction sector.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter covers the summary, conclusion, and recommendation of the study.

Summary

The study investigates how changing building and woodworking technology trends affect the construction sector and the training of industrial technical education students. As the sector progressively combines new technologies and sustainable practices, technical education curricula must keep up, ensuring graduates are prepared for modern challenges and advances in the field. To meet the study's aims, the following research questions were formulated:

- How do developing building and woodworking technology developments affect the Nigerian and African construction industries?
- What skills and knowledge are necessary for the modern construction industry in Nigeria and Africa?
- Do present industrial technical education programs in Nigeria adequately prepare students for the modern construction industry?

A descriptive survey design was used to obtain quantitative data, with a structured questionnaire used to elicit insights from 120 industrial technical education students at

the Department of Vocational Technical Education. The questionnaire items were designed to assess respondents' perspectives on advances in building and woodworking technologies, required skills, and curricular relevance. To understand the responses, the data were analyzed with means and standard deviations.

The findings highlight the critical need to close the gap between industrial technical education and industry demand. The rapid advancement of building and woodworking technologies necessitates an educational system that is both adaptable and responsive to industry trends. The study's findings show that, while students understand the importance of new trends, they lack proper exposure and training due to outmoded curricula and limited hands-on experiences.

This study is consistent with previous research that advocates for the incorporation of digital literacy and sustainable practices into technical education. The lack of these factors limits students' preparation for the professional world, a problem that can be solved by changing curricula to include real-world applications, updated technical tools, and environmental education. Furthermore, practical skill development is identified as an area where technical education programs might improve, ensuring that graduates have not only theoretical knowledge but also hands-on experience that fulfills industry standards.

Conclusion

The findings of the study indicate the need for a full update to the industrial technical education curriculum to better correspond with current developments in building and woodworking technologies. Analyzing the collected data reveals that the construction sector is fast evolving through the incorporation of digital technologies, sustainable practices, and innovative approaches. However, existing technical education programs are not keeping up with these improvements, leaving a huge gap between what students learn and what is expected of them in the workplace. This disparity affects not only students' future employment but also the industry's general competitiveness and creativity.

Emerging technology, such as computer-aided design (CAD) software, automated machinery, and sustainable building materials, are changing the way construction projects are planned, developed, and built. The study found that while students understand the value of these technologies, their educational experiences frequently lack practical instruction or adequate exposure to these tools. This lack of hands-on experience is a significant shortcoming since it leaves pupils unprepared for the demands of a technologically savvy industry. By incorporating these evolving tools and techniques into technical education curricula, students can gain relevant skills that will improve their flexibility and productivity in today's construction environment.

The results also emphasized the vital importance of incorporating sustainability into technical education. As the global construction industry evolves toward eco-friendly

practices, technical education must keep up by adding environmental awareness and sustainable material utilization into its programs. Students who enter the profession with knowledge of sustainability are better positioned to contribute to responsible building methods that correspond with global trends. This readiness is critical for the future workforce, as construction processes are projected to become more regulated to limit environmental impacts.

Furthermore, the study noted the need for a more skill-oriented, practical approach to technical education programs. Although academic knowledge is still valuable, the market requires graduates who can apply their talents practically and innovate in real-world settings. The conventional emphasis on classroom-based theoretical learning has proven insufficient in training students to deal directly with industry difficulties. A shift toward project-based learning, internships, and other experiential opportunities would provide students with an applied grasp of their area, allowing them to gain a better understanding and confidence in their technical skills.

In analyzing these data, it is evident that technical education institutions must rethink their curricula, not only to suit the current needs of the construction industry but also to predict future changes. In doing so, they would provide students with a comprehensive skill set that includes both current industry practices and emerging trends. Preparing students in this manner can produce a generation of graduates who are resilient, innovative, and capable of improving the industry with their talents and perspectives.

Recommendations

Based on the study's findings, numerous recommendations are made to close the identified gaps between present technical education programs and the demands of modern building and woodworking technology:

1. Technical education institutions should modernize programs to incorporate current building technology, environmental practices, and digital tools like CAD software. By aligning coursework with industry norms, universities can better prepare students for the labor market and increase employability.
2. Practical training, such as workshops, simulations, internships, and project-based learning, should be included in technical education programs. Practical experience with new tools and technologies will help students transfer more smoothly into the workplace with the abilities they require.
3. As the building sector becomes more eco-friendly, technical education programs should incorporate sustainability principles into their curriculum. Introducing sustainable materials and techniques will prepare students to participate responsibly in the industry.
4. Partnerships between technical universities and industry stakeholders can provide possibilities for internships, mentorships, and exposure to cutting-edge technologies. These alliances can help colleges keep up with industry changes and improve students' learning experiences.

5. To support curriculum changes, lecturers should receive training on current trends and technology. This will allow instructors to more effectively incorporate new knowledge into their teaching.

REFERENCES

- Akinyemi, T. (2019). *Sustainable Construction and the Adoption of New Technologies in Nigeria*. *Journal of African Built Environment*, 5(3), 23-45.
- Okorie, P. (2021). *The Future of Technical Education in Africa: Responding to Industry Trends*. *Nigerian Journal of Vocational Education*, 14(1), 76-89.
- Olugbenga, O. (2020). *Green Building and Sustainable Materials: Challenges in the Nigerian Context*. *African Journal of Environmental Science*, 8(2), 110-126.
- Okochi, I., & Nwosu, E. (2023). *Digital Woodworking Tools and Their Implications for Technical Education in Nigeria*. *Journal of Technical and Vocational Education*, 12(4), 101-117.
- Adebayo, T. (2020). *Innovative Approaches in Industrial Technical Education and the Influence of Emerging Technologies on Nigerian Workforce Development*. *Journal of African Industrial Studies*, 12(1), 45-63.
- Anaele, E. O. (2018). Problems of building construction in Nigeria. *Ebonyi Technology and Vocational Education Journal*, 1(1), 61 – 70.
- Dewi, S. S. and Sudira, P., (2018) “The Contribution of Teaching Factory Program Implementation on Work Readiness of Vocational High School Students In Makassar,” *Journal of Educational Science and Technology*, 4 (2) 126–131.
- Masaruf, M. & Muhammad S. I. (2016). The Architectural Education Curriculum in the Nigerian Schools of Architecture. *IOSR Journal of Research & Method in Education* 6(6), pp. 13- 17. DOI:10.9790/7388-0606081317
- Okeke, F.O., Chukwuali, B.C. and Idoko, A.E. (2019), Environmentally-responsive design; A study of Makoko floating school building. *International Journal of Development and Sustainability*. 8(8), pp. 476- 487 IJDS18070302.

- Samphina Academy (2020). Polytechnics in Nigeria offers Building Technology. Available at: <https://samphina.com.ng/polytechnics-offering-building-technology-nigeria/> Accessed: 14/08/2023.
- Mulki, J., Jaramillo, F. & Locander, W. (2016). Effects of ethical climate and supervisory trust on salesperson's job attitudes and intentions to quit. *Journal of Personal Selling and Sales Management*, 26(1), 20-26.
- Musibau, A. Y., & Festus, O. A. (2014). Effective tertiary education management in Nigeria as a panacea to good governance and national security. *Higher Education of Social Science*, 7(3), 1-6.
- Okorafor, A. O. and Nnajiifo, F. N. (2017). TVET Policies and Practices in Nigeria: Why the Gap. *European Journal of Education Studies*. Available on-line at: www.oapub.org/edu doi:105281/zenodo.494996. 3(4) Pp. 617 – 621.
- Federal Republic of Nigeria. (2014). *National Policy on Education*. Yaba, Lagos: NERDC Press.
- Akintola, A., & Dada, O. (2019). The construction industry in Nigeria: Growth, challenges and prospects. *International Journal of Civil Engineering and Technology (IJCIET)*, 10(7), 1218–1229.
- Uwaifo, A. I. (2013). An evaluation of the role of technical education in Nigeria's industrial development. *The Nigerian Journal of Sociology and Anthropology*, 13, 221–232.
- Nwosu, E. (2021). *Bridging the Gap: Aligning Technical Education with Industry Needs in Nigeria*. *Nigerian Journal of Vocational and Technical Studies*, 9(3), 33-48.
- Omole, F. (2021). *Digital Skills in Technical Education: A Case Study of CAD and Precision Tools in Nigerian Industrial Training*. *Journal of Construction and Industrial Education*, 8(3), 67-83.

- Amadi, C. (2020). *The Role of Socio-Technical Approaches in Industrial Technical Education: A Nigerian Perspective*. Journal of Technical and Vocational Education, 15(3), 45-61.
- A Review of Sustainable Building Materials for Developing Countries*." (2011). O. A. Olaniran and A. I. Osinubi. *Construction and Building Materials*, 25(2), pp. 878–889.
- Adebayo, M. (2021). *Enhancing Workforce Productivity Through Digital Literacy Training in Nigerian Industries*. Journal of Industrial Research, 14(2), 78-92.
- Adebayo, O. (2020). *The Role of Modern Technologies in Enhancing Efficiency in the Construction Sector in Nigeria*. Journal of African Construction Studies, 5(2), 23-34.
- Adeyemi, A., & Awojobi, O. (2022). *Socio-Technical Approaches to Improving Technical Education in Nigeria*. Journal of Technical Education and Management, 10(1), 14-29.
- Nwosu, E. (2021). *Skills Gap in Nigeria's Construction Sector: Challenges and Opportunities*. Nigerian Journal of Vocational and Technical Education, 9(3), 33-48.
- Okeke, J. (2021). *Constructivist Approaches in Technical Education: Enhancing Learning in Nigerian Technical Schools*. African Journal of Educational Research, 6(2), 54-67.
- Eze, P. (2021). *Emerging Technologies in the Nigerian Woodworking Sector: A Review of Current Practices*. Journal of Wood Science and Technology in Africa, 10(3), 89-101.

- Adeyemi, A., & Ibe, C. (2022). *Sustainable Building Materials in Nigeria's Construction Industry: Implications for Technical Education*. African Journal of Environmental Studies, 10(1), 88-105.
- Nwankwo, B. (2020). *Bridging the Skills Gap: Challenges in Nigerian Technical Education and the Adoption of Modern Building Technologies*. African Journal of Technical and Vocational Education, 7(3), 67-82.
- Obe, P. I., Onah, E., & Onah, O. (2022). *The Role of Technical Education in Adapting to Emerging Building Technologies in Africa*. Journal of African Technical and Vocational Education, 18(2), 112-130.
- Renault, D., & Agumba, J. (2016). *Project Management Practices in Construction: The Role of Emerging Technology in Sub-Saharan Africa*. African Journal of Construction and Management, 9(1), 45-59.
- Yang, X., Zhang, L., Li, S., & Chen, J. (2022). *Digital Literacy and Technical Skills for Future Workforce Development in Construction Industries*. International Journal of Vocational Education and Training, 29(4), 303-320.
- Castaneda, M., Kolenikov, S., & Thompson, C. (2003). *The Impact of Technical Skills on Workforce Performance: A Global Perspective*. Global Journal of Technical and Vocational Education, 5(3), 211-229.
- Serumu, I. (2014). *Challenges and Opportunities in Technical Education: An African Perspective*. Journal of Nigerian Vocational Studies, 8(1), 89-98.
- Okebukola, P., & Okolocha, C. (2012). *Revitalizing Technical Education in Nigeria: Strategies for Developing Workforce Skills*. Nigerian Journal of Education, 7(2), 143-158.

McGrath, S. (2014). *Education and Development in Africa: Vocational Skills for a Changing Workforce*. African Journal of Development Studies, 11(1), 63-78.

APPENDIX

¹⁸ DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

UNIVERSITY OF BENIN

BENIN CITY

Dear Respondents,

This questionnaire is a data collection tool created for an undergraduate research project titled "Emerging Trends in Building and Woodwork Technology: Implications for Industrial Technical Education."

Please contribute to this research by taking a few minutes to answer the questions mentioned below. Please keep ³⁴ in mind that your responses will be kept strictly confidential and used only for this research.

I appreciate your cooperation.

DAVID OMONIGHO EMMANUEL

Section A: DEMOGRAPHIC INFORMATION

Sex: ³⁶ (a) Male [], (b) Female []

Age: (a) 18-20yrs [] (b) 21-25yrs [] (c) 25 and above []

Section B

KEYS:

¹⁵ Strongly Agree (AD) = 4, Agree (A) = 3, Disagree (D) = 2, Strongly Disagree (SD) = 1

S/N	ITEM SELECTION				
	What are the key emerging trends in building and woodworking technology that are impacting the construction industry in Nigeria and Africa?	⁶ S.A 4	A 3	D 2	S.D 1
1	The Nigerian and African construction industries are progressively adopting new sustainable building materials.				
2	Building Information Modeling (BIM) and other digital tools are increasingly used in construction operations.				

3	Prefabrication and modular construction are becoming popular alternatives to traditional construction processes.				
4	Automation and robotics are transforming construction and woodworking processes.				
5	Eco-friendly and energy-efficient building solutions are becoming increasingly popular in Nigeria and Africa.				
	The specific skills and knowledge required by the modern construction industry in Nigeria and Africa.	S.A	A	D	S.D
		4	3	2	1
6	Technical professionals must have good computer-aided design (CAD) and 3D modeling skills for modern building projects.				
7	Students pursuing industrial technical education must understand sustainable construction principles.				
8	The construction business requires knowledge of digital project management software, such as Primavera or MS Project.				

9	Industry preparation requires proficiency in certain construction-related health and safety practices.				
10	Mastery of modern woodworking machinery and processes is essential for graduates joining the field.				
	To what extent do the current curriculum and teaching methods in industrial technical education programs in Nigeria address the skills and knowledge required by the modern construction industry?	⁶ S.A 4	A 3	D 2	S.D 1
11	The curriculum for industrial technical education includes suitable instruction in digital construction equipment and software.				
12	Students gain practical, hands-on experience with current construction technology as part of their study.				
13	Industrial technical education programs in Nigeria successfully include sustainable construction principles.				

14	The program covers current courses on sophisticated woodworking machinery and processes.				
15	Teaching approaches in industrial technical education highlight skills required in today's labor market.				

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