STRATAGIES FOR IMPROVING THE TEACHING AND LEARNING OF INDUSTIRAL AND TECHNICAL EDUCATION IN UNIVERSIY OF BENIN, EDO STATE

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A RESEARCH PROJECT WRITTEN IN THE DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION, FACULTY OF EDUCATION, UNIVERSITY OF BENIN, BENIN CITY. IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE EDUCATION DEGREE B.Sc. (Ed.) IN INDUSTRIAL AND TECHNICAL EDUCATION (ELECTRICAL AND ELECTRONICS OPTION)

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APPROVAL PAGE

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DEDICATION

This project is dedicated to God Almighty from whom all knowledge, wisdom and understanding, good health, strength and for his guidance and protection during this work thus far.

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ABSTRACT

This research project, titled Strategies for Improving Teaching and Learning of Industrial and Technical Education in the University of Benin, Edo State

This study, seeks to identify these challenges and propose sustainable strategies to enhance the teaching and learning processes in the ITE department. The research adopts a mixed-method approach, combining qualitative and quantitative data collection techniques to ensure a comprehensive analysis of the issues. Data was gathered through structured questionnaires distributed to students, in-depth interviews with lecturers, and focus group discussions with key stakeholders, including administrative staff and industry professionals. Additionally, observational methods were employed to assess the state of infrastructure, teaching materials, and practical training facilities within the department. The study population comprised students and lecturers from the ITE department, as well as industry experts who provided insights into the relevance of the current curriculum to real-world industrial needs.

The findings of the study reveal several critical challenges impeding the effectiveness of ITE education at the University of Benin. These include inadequate funding, which has led to a shortage of modern equipment and teaching resources; outdated curricula that fail to align with current industry standards; insufficient practical training opportunities for students; and a lack of motivation among both students and lecturers due to poor working and learning conditions. Furthermore, the study highlights the limited collaboration between the university and industries, which restricts students'

exposure to real-world technical environments and hinders their readiness for the job market. Based on these findings, the study proposes a series of actionable strategies to improve the quality of ITE education. These strategies include the modernization of teaching facilities through increased funding and investment in state-of-the-art equipment; the revision of the ITE curriculum to incorporate emerging technologies and industry trends; the establishment of stronger partnerships with industries to provide students with hands-on training and internship opportunities; and the implementation of professional development programs for lecturers to enhance their teaching methodologies and technical expertise. Additionally, the study recommends the introduction of incentive schemes to motivate both students and lecturers, as well as the creation of a more conducive learning environment through improved infrastructure and resource allocation. The study concludes that the successful implementation of these strategies will not only enhance the quality of teaching and learning in the ITE department but also ensure that graduates are well-equipped with the skills and knowledge required to thrive in the competitive industrial and technical sectors. By addressing the identified challenges and adopting the proposed solutions, the University of Benin can position itself as a leading institution for Industrial and Technical Education in Nigeria, contributing significantly to national development and economic growth. This research, therefore, provides a valuable framework for policymakers, educators, and stakeholders seeking to improve the standards of technical education in Nigerian universities.

CHAPTER ONE

INTRODUCTION

Background of the Study

Industrial and technical education plays a fundamental role in the development of any nation, as it provides individuals with the skills and competencies needed to operate effectively in technical and industrial environments. In Nigeria, where the economy has been heavily reliant on oil and gas for decades, there is an urgent need to diversify and develop other sectors of the economy, including manufacturing, construction, engineering, and information technology. Industrial and technical education is at the heart of this transformation, as it prepares the workforce for the technical and vocational demands of these sectors (Ojo, 2020).

The Nigerian government, through various policies and educational reforms, has long recognized the importance of industrial and technical education as a tool for national development. The National Policy on Education outlines the need for a functional education system that emphasizes skills acquisition, innovation, and self-reliance. However, despite these policies, the implementation of industrial and technical education in Nigerian universities has been fraught with challenges, leading to suboptimal outcomes for students and the economy at large (Egbule, 2021). The University of Benin, one of Nigeria's leading institutions, offers programs in industrial and technical education with the goal of producing graduates who are well-equipped to meet the demands of the modern economy. These programs are designed to provide students with both theoretical

knowledge and practical skills in areas such as mechanical engineering, electrical engineering, woodwork, metalwork, and automotive technology. However, like many other universities in Nigeria, the University of Benin faces significant challenges in delivering quality industrial and technical education (Omoera, 2022). One of the key challenges is the over-reliance on traditional teaching methods, which are often inadequate for technical fields. In many cases, lecturers continue to use lecture-based approaches that focus on theoretical concepts, with limited opportunities for students to engage in hands-on, practical learning (Aghaulor, 2020). Though the theory is important in understanding the underlying principles of technical subjects, practical experience is essential for students to develop the skills required to work in technical industries. Unfortunately, many students in industrial and technical education programs graduate with limited practical experience, making them ill-prepared for the demands of the workforce.

In contrast to Nigeria, developed countries have made significant strides in integrating modern teaching methods into their industrial and technical education programs. For instance, the use of simulation tools has become widespread in technical education in countries such as Germany, the United States, and Japan. These tools allow students to practice skills in a virtual environment before applying them in real-world settings (Ololube & Egbezor, 2021). For example, students in mechanical technology programs may use simulation software to design and test mechanical systems, while students in electrical technology can use virtual laboratories to build and test circuits.

This approach not only makes learning more engaging but also reduces the cost of providing physical equipment for every student.

Nigeria's technical education system, including that at the University of Benin, has been slow to adopt such innovations due to several factors. One major issue is the lack of funding for education, which has hampered the ability of universities to invest in modern equipment, software, and training for lecturers (Ezeani & Eze, 2020). The funding allocated to education in Nigeria's national budget has consistently fallen below the recommended 26% by UNESCO, leading to inadequate resources for institutions, particularly in technical and vocational programs. As a result, many Nigerian universities still rely on outdated equipment and teaching methods that do not align with the current technological landscape.

Moreover, the disconnect between industry and academia further exacerbates the challenges in industrial and technical education in Nigeria. In many developed countries, there is a strong partnership between universities and industries, allowing students to gain practical experience through internships, co-op programs, and apprenticeships. These collaborations also provide universities with the latest equipment and technologies, ensuring that students are learning skills that are relevant to the job market (Omoera, 2022). In contrast, Nigerian universities have limited collaboration with industries, which means that students often graduate without any real-world experience or exposure to modern tools and technologies.

This disconnect between industry and academia also extends to the curriculum used in many Nigerian universities. The curricula for industrial and technical education programs are often outdated and do not reflect the current needs of the job market (Egbule, 2021). For instance, while the global economy is increasingly shifting towards renewable energy, robotics, automation, and artificial intelligence, these topics are often not adequately covered in Nigerian industrial and technical education programs. As a result, graduates may find themselves ill-equipped to work in these emerging fields, both in Nigeria and internationally. In addition to these challenges, the lack of professional development for lecturers in Nigerian universities is another critical issue. Many lecturers in industrial and technical education programs have not received the necessary training to incorporate modern teaching methods and technologies into their classrooms. As a result, they may continue to rely on outdated methods that do not engage students or adequately prepare them for the workforce (Ololube & Egbezor, 2021). Professional development programs that focus on up skilling lecturers in areas such as e-learning, the use of simulation tools, and industry-standard software are essential for improving the quality of teaching in industrial and technical education.

Hands-on learning is a critical component of industrial and technical education, as it allows students to apply theoretical concepts to real-world problems. However, the University of Benin, like many other Nigerian universities, lacks the necessary infrastructure to support hands-on learning. Many of the laboratories and workshops in the university are either outdated or insufficiently equipped, limiting the opportunities for

students to engage in practical activities (Aghaulor, 2020). This is a significant issue because technical education requires students to work with tools, machinery, and equipment to develop the skills needed for their future careers.

To address these challenges, there is a growing consensus that innovative teaching strategies are needed to improve the quality of industrial and technical education in Nigeria. One such strategy is problem-based learning (PBL), which shifts the focus from traditional lecture-based teaching to a more interactive and student-centered approach. In PBL, students are presented with real-world problems that they must solve using both theoretical knowledge and practical skills. This approach encourages critical thinking, collaboration, and problem-solving, which are essential skills in technical fields (Omoera, 2022). PBL also allows students to work on projects that simulate real-world scenarios, providing them with the hands-on experience needed for the workforce.

Another strategy is the use of digital tools and e-learning platforms to enhance the teaching and learning of industrial and technical education. The COVID-19 pandemic has demonstrated the importance of technology in education, as many universities around the world shifted to online learning during the lockdowns. While the shift to online learning presented challenges, it also highlighted the potential for digital tools to supplement traditional teaching methods (Ojo, 2020). In technical education, digital tools such as simulation software, virtual laboratories, and online collaborative platforms can be used to enhance practical learning and provide students with opportunities to practice their skills in a virtual environment. In addition to problem-based learning and the use of

digital tools, there is also a need for greater collaboration between universities and industries to improve the quality of industrial and technical education in Nigeria.Industry partnerships provide universities with access to cutting-edge technologies, equipment, and expertise, enabling students to acquire job market-relevant skills. Moreover, these partnerships can provide students with opportunities for internships, co-op programs, and apprenticeships, allowing them to gain valuable real-world experience before they graduate (Ololube & Egbezor, 2021). Strengthening the link between industry and academia is essential for bridging the gap between theoretical knowledge and practical skills in industrial and technical education.

The Nigerian government also has a critical role to play in improving the funding and infrastructure for industrial and technical education. While the government has made efforts to improve education through policies and reforms, the implementation of these policies has often been hindered by a lack of funding and resources (Ezeani & Eze, 2020). Increasing the budget allocation for education, particularly for technical and vocational educational programs, would allow universities to upgrade their laboratories, workshops, and equipment, providing students with the tools they need to succeed. In addition, the teaching and learning of industrial and technical education in Nigerian universities, including the University of Benin, face several significant challenges that hinder their effectiveness. These challenges include the reliance on traditional teaching methods, lack of modern equipment and technology, disconnect between industry and academia, outdated curricula, and limited professional development for lecturers. However, by

adopting innovative teaching strategies such as problem-based learning, integrating digital tools, strengthening industry partnerships, and improving funding, Nigerian universities can enhance the quality of industrial and technical education. These strategies will not only improve student learning outcomes but also ensure that graduates are well-prepared to contribute to the growth and development of Nigeria's economy.

Statement of the Problem

The teaching and learning of industrial and technical education in Nigerian universities, particularly at the University of Benin, face numerous challenges that hinder the achievement of its objectives. These challenges affect the quality of graduates produced and their readiness to meet the demands of the modern workforce. The issues include: The University of Benin, like many other Nigerian universities, suffers from outdated or insufficient laboratory and workshop facilities. These limitations hinder students' ability to practice with tools and machinery relevant to their disciplines. The absence of modern equipment and infrastructure impairs the development of technical competencies necessary for industrial and technical careers (Ezeani & Eze, 2020).

There is a significant gap between industry requirements and the training provided in universities. Unlike developed countries where industry-academia collaborations facilitate internships, co-op programs, and access to modern technologies, such partnerships are minimal in Nigerian universities. This disconnect results in students graduating without real-world experience or exposure to the latest industry trends (Omoera, 2022).

The curriculum for industrial and technical education in Nigerian universities often fails to reflect advancements in technology and the evolving needs of the global workforce. While industries worldwide increasingly focus on areas like renewable energy, robotics, automation, and artificial intelligence, these topics are either inadequately addressed or absent in the current curriculum (Egbule, 2021). This mismatch leaves graduates unprepared for emerging technical roles. Inadequate funding is a persistent issue affecting technical education in Nigeria. The national education budget allocation consistently falls below the UNESCO-recommended 26%, limiting the resources available for universities to upgrade facilities, procure modern equipment, and support research and development (Ezeani & Eze, 2020).

The University of Benin has been slow to adopt digital tools, simulation software, and virtual laboratories, which are increasingly used in industrial and technical education globally. These tools are essential for providing students with engaging, cost-effective, and accessible learning opportunities, especially for complex technical tasks (Ojo, 2020). In addition, the teaching and learning of industrial and technical education at the University of Benin are plagued by several critical issues that undermine the program's effectiveness. The reliance on traditional teaching methods, coupled with outdated equipment and insufficient infrastructure, limits students' practical exposure and skill acquisition. The disconnect between industry and academia further exacerbates the problem, leaving students unprepared for real-world challenges due to a lack of internships and industry-standard training. This form the basis for the study.

Purposes of the Study

The main objective of this study is to explore strategies for improving the teaching and learning of industrial technical education at the University of Benin. Specifically, the study aims to:

1. Investigate the current teaching methods employed in industrial technical education.
2. Identify challenges faced by lecturers and students in the learning process.
3. Examine the role of modern technology and hands-on learning in improving student engagement.
4. To propose innovative strategies that can enhance the effectiveness of teaching and learning.

Research Questions

This study will be guided by the following research questions:

1. What are the current teaching strategies employed in industrial technical education at the University of Benin?
2. What challenges do lecturers and students face in the teaching and learning process?
3. How can modern technology be integrated into the teaching of industrial technical education to improve learning outcomes?
4. What innovative strategies can be adopted to enhance practical learning experiences for students?

Hypotheses

The following hypotheses are proposed to guide this study:

H_1: There is no significant relationship between teaching strategies currently employed in industrial technical education at the University of Benin that enhance learning outcomes.

H_2: There is no significant relationship between the challenges lecturers and students face in the teaching and learning process.

H_3: There is no significant relationship between modern technology been integrated between the teaching of industrial technical education and improved learning outcomes.

H_4: There is no significant relationship between the innovative strategies that can be adopted to enhance practical learning experiences for students.

Significance of the Study

This study is of significant importance due to the increasing need to improve the quality of industrial and technical education in Nigerian universities, particularly at the University of Benin. By addressing the challenges currently faced in the teaching and learning process, this study will provide valuable insights and recommendations for enhancing industrial and technical education programs, making them more relevant to the demands of the modern workforce and aligned with global trends in technology and innovation.

This study will also contribute to the academic and practical development of industrial and technical education in Nigerian universities. It aims is to identify and propose effective strategies that will improve the quality of education in this field, especially in light of current challenges such as outdated teaching methods, limited infrastructure, and insufficient industry collaboration. The findings will provide a roadmap for creating a more dynamic, hands-on, and modernized approach to teaching and learning in industrial and technical education. Additionally, the study will explore the role of modern technology in enhancing student engagement and practical learning, which is crucial in preparing graduates for the rapidly evolving job market.

The primary beneficiaries of this study will be the students in the Industrial and Technical Education programs at the University of Benin. The study will help identify ways to improve the learning experience, increase practical engagement, and ultimately enhance their employability by aligning their education with industry needs.

Administrators and curriculum developers will gain valuable information regarding the areas of improvement in curriculum design, technology integration, and industry partnerships. These findings will aid in revising and modernizing the curriculum to better prepare students for real-world challenges.

This study will also benefit policymakers in the education sector by providing data-driven recommendations on improving the funding, infrastructure, and strategic partnerships necessary to enhance the quality of industrial and technical education across Nigerian universities. Industries in Nigeria will benefit indirectly by having access to

graduates who are better equipped with the practical and technical skills required in the workforce, reducing the need for extensive retraining and fostering a more skilled labor force.

Scope of the Study

The scope of this study is limited to the University of Benin, specifically the Department of Industrial and Technical Education. The research will focus on exploring current teaching methods, identifying challenges faced by both lecturers and students, and proposing strategies for improvement. While the findings may have broader implications for other universities in Nigeria, the primary focus will be on the University of Benin.

Definition of Terms

Industrial Technical Education: A branch of education that focuses on teaching students the skills and knowledge necessary for working in industries such as manufacturing, construction, and engineering.

Teaching Strategies: These are methods and techniques used by lecturers to impart knowledge and skills to students.

Hands-on Learning: A teaching method that involves students actively participating in practical tasks or projects to enhance their understanding of theoretical concepts.

Innovative Approaches: New or creative methods of teaching that improve the effectiveness of education and student engagement.

Curriculum: The set of courses and content offered by an educational institution in a particular field of study.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, relevant literature to the study will be reviewed. Specially, the chapter is organized and presented under the following sub-headings:

- Theoretical Framework
- Concept of Industrial Technical Education
- Role of Government Policies in Industrial Technical Education
- Influence of Technology on Industrial Technical Education
- Teaching Methods in Industrial Technical Education
- Challenges in Teaching and Learning Industrial Technical Education
- The Role of Instructors in Industrial Technical Education
- Curriculum Development in Industrial Technical Education
- Professional Development of Lecturers in Industrial Technical Education
- Strategies for Improving Teaching and Learning in Industrial Technical Education
- Empirical Related Studies
- Summary of Related Literature

Theoretical Framework

John Dewey believed that education should be student-centered and focused on real-life experiences. He emphasized the importance of hands-on learning and the integration of knowledge across different subjects.

Vygotsky's sociocultural theory, also emphasizes the role of social interaction and collaboration in learning. Vygotsky believed that learning occurs through interactions with more knowledgeable others, such as teachers and peers. He emphasized the importance of scaffolding, where teachers provide support and guidance to help students reach higher levels of understanding. Vygotsky's perspective agreed that learning is a social process and that students learn best when they are actively engaged in meaningful interactions with others.

Piaget's theory of cognitive development is another influential perspective and Piaget believed that children construct their own knowledge through active exploration and interaction with their environment. He emphasized the importance of hands-on experiences and the need for students to actively engage in problem-solving and critical thinking. Piaget's perspective agreed that learning is an active process and that students learn best when they are given opportunities to explore and discover knowledge for themselves.

The evolution of learning has seen a shift from traditional instructional methods to more student-centered approaches. There is a growing recognition that students learn best when they are actively engaged in the learning process and when they can connect their learning to real-life experiences. However, there are still challenges in instructional design. One current problem is the overemphasis on standardized testing, which can lead to a narrow focus on rote memorization and a lack of emphasis on critical thinking and

problem-solving skills. There is a need for instructional design that promotes deeper learning and the development of 21st-century skills.

Technology plays a crucial role in education today. It provides access to a wealth of information and resources, enhances communication and collaboration, and allows for personalized learning experiences. Technology can support constructivist approaches by providing students with opportunities to explore and create, collaborate with others, and engage in authentic, real-world tasks. However, it is important to ensure that technology is used in a meaningful and purposeful way, and that it does not replace the role of the teacher or hinder social interaction and hands-on learning experiences.

Schools can meet the diverse needs of students by adopting a differentiated instruction approach. This involves recognizing and addressing the unique strengths, interests, and learning styles of each student. Differentiated instruction allows for flexibility in teaching methods, assessment strategies, and learning materials to accommodate the diverse needs of students. It promotes inclusivity and ensures that all students have access to a high-quality education. Additionally, schools can create a supportive and inclusive learning environment by promoting cultural responsiveness, fostering positive relationships, and providing appropriate support services for students with special needs. Hence, this study will examine the strategies for improving teaching and learning of industrial technical education in the University of Benin.

John Dewey, Lev Vygotsky, and Jean Piaget: Constructivism in Industrial and Technical Education

The constructivist framework, advocated by John Dewey, Lev Vygotsky, and Jean Piaget, asserts that learning is an active and dynamic journey rather than a passive reception of information, where learners build knowledge through their experiences, interactions, and reflections. This educational philosophy is perfectly suited to industrial and technical education, where students develop skills in areas such as mechanics, carpentry, agriculture (e.g., tomato cultivation), or manufacturing through practical engagement, collaboration, and problem-solving. Each theorist contributes distinct insights that can enhance these programs and provide benefits for students.

Learning by Engaging in Practical Activities in Industrial and Technical Settings John Dewey's educational principles are based on experiential learning—"learning by doing"—where education is grounded in real-world problem-solving and reflective practices. He believed that students learn most effectively when involved in meaningful activities that relate to their lives and prospective roles. In the context of industrial and technical education, this means hands-on workshops, apprenticeships, or projects such as creating a tool, fixing machinery, or implementing pest management in tomato production. Dewey posited that education should prepare individuals for active participation in democracy and responsible citizenship, making it highly applicable to vocational training, which empowers people to contribute to industry and society.

In practical terms, Dewey's philosophy implies that students in a technical program might construct a functional model—such as a solar-powered irrigation system—rather than merely studying it theoretically. This endeavor includes trial, error,

and reflection, promoting critical thinking and adaptability. Such active involvement ensures that learning remains concrete and linked to immediate results, reflecting the realities of industrial environments where innovation and problem-solving are crucial for success.

The Importance of Social Interaction and Team-Based Learning: Lev Vygotsky's sociocultural perspective emphasizes that learning occurs in a social context, influenced by interactions with classmates, educators, and cultural tools. His idea of the Zone of Proximal Development (ZPD)—the space between what a learner can accomplish independently and with support—underscores the significance of collaboration and scaffolding in acquiring skills. In industrial and technical education, this is realized through group assignments, mentorship programs, or peer teaching, where students learn from each other's abilities and experiences.

For instance, a student who has mastered welding might support a fellow student who is having difficulty with the technique, while an instructor provides scaffolding through specific feedback. Vygotsky's emphasis on cultural tools—such as machinery, software, or farming equipment—also aligns with technical education, where learners use industry-related tools to gain knowledge. Social interaction in this setting resembles real-world technical teams, preparing students for collaborative industrial workplaces where effective communication and teamwork are essential.

Learning Through Hands-On Exploration and Development Jean Piaget's theory of cognitive development focuses on how learners actively construct knowledge through

different stages—sensorimotor, preoperational, concrete operational, and formal operational—by engaging with their surroundings. Although Piaget primarily studied children, his concepts are applicable to technical education, highlighting the importance of hands-on exploration and problem-solving. In the concrete operational stage (ages 7-11) and later, students handle physical objects to comprehend concepts, a principle that applies to vocational training where learners engage with tools, materials, and systems.

In an industrial context, Piaget's principles might manifest when students disassemble a motor engine to understand mechanical concepts, adjusting their knowledge (accommodation) as they face challenges like misaligned components. This hands-on interaction fosters the development of schemas—mental constructs that grow with experience—equipping students to address complex technical tasks. Piaget's emphasis on learner-driven exploration aligns well with the independent nature of mastering a trade, where trial and error gradually enhance skills.

Reworking with Constructivist Ideals

The collaboration of Dewey, Vygotsky, and Piaget creates a constructivist framework that emphasizes active learning and social interaction—essential elements of industrial and technical education. Dewey's emphasis on experiential learning ensures that skills are practiced in relevant contexts, Vygotsky's focus on social interaction encourages collaboration and mentorship, and Piaget's cognitive exploration fosters foundational understanding through practical experiences. This combination

revolutionizes technical education into an engaging process where students actively engage as creators of their knowledge, equipped for real-world applications.

Incorporating these constructivist theories into industrial and technical education provides significant advantages for students, improving their skill development, job readiness, and personal growth. Here's a breakdown of the benefits: Dewey's principle of "learning by doing" guarantees that students go beyond rote memorization and instead internalize skills through practice—such as diagnosing a malfunctioning circuit or grafting tomato plants for pest resistance. Piaget's hands-on exploration supports this, enabling students to develop technical skills by engaging directly with real materials and systems. The outcome? Graduates who are immediately effective in industries like manufacturing or agriculture, equipped with expertise shaped by practical experience rather than theory only.

Constructivism is fueled by challenges—Dewey's reflective practices encourage students to investigate the reasons behind a welding failure, while Piaget's adaptation processes aid them in modifying their solutions. In technical environments, where machinery failures or pest issues require rapid responses, the capacity to troubleshoot and innovate becomes invaluable. Students graduate as adaptive problem-solvers, capable of managing the unpredictable aspects of industrial work.

Vygotsky's focus on social dynamics is prominent in this context. Through group activities—like designing a conveyor system or implementing pest control strategies—students develop skills in communication, delegation, and harnessing

collective strengths. This reflects real-world industrial scenarios, where collaborative efforts are essential for project success, training students for positions in environments like factories, farms, or construction sites where teamwork enhances productivity.

Engagement in active learning cultivates confidence. When students successfully create a functioning product or solve a significant problem—such as minimizing losses in tomato yield—they develop a sense of ownership over their achievements, a quality linked to cognitive independence by Piaget. Vygotsky's supportive mentoring further enhances this confidence, as acknowledgment of their progress empowers them to approach industrial tasks with assurance.

The fields of industrial and technical education are continuously evolving—new tools, techniques, and challenges frequently arise. Dewey's reflective approach, Piaget's developmental stages, and Vygotsky's emphasis on cultural resources encourage a mindset geared toward ongoing development. Students learn to pursue knowledge actively through various means, including peers, mentors, and experiential learning, ensuring they remain competitive in an ever-changing job market.

Concept of Industrial Technical Education

Industrial technical education (ITE) plays a pivotal role in developing the skills and competencies required to support a nation's industrial and technological growth. It refers to the systematic training provided to individuals in the technical and industrial fields, such as mechanical technology, electrical technology, construction, automotive technology, welding, manufacturing, and information technology. In essence, industrial

technical education combines both theoretical knowledge and practical skills, preparing students for careers in industries that require specialized technical expertise (Omoera, 2022). In the context of Nigeria's developmental challenges, the relevance of ITE cannot be overemphasized as it holds the potential to transform the country's workforce and drive industrialization.

The historical development of industrial technical education in Nigeria dates back to the pre-independence era, when vocational and technical training was provided by missionaries and colonial administrations to cater to specific industries, such as agriculture, mining, and trade. Over the years, the Nigerian government has taken steps to institutionalize and expand technical education, particularly through the establishment of technical colleges, polytechnics, and universities offering technical and vocational programs. However, the pace of development in this sector has been slow, and the quality of education offered in many Nigerian institutions remains below global standards. In an era where industries are rapidly evolving due to technological advancements, Nigerian universities, including the University of Benin, must prioritize the improvement of their industrial technical education programs to remain relevant and competitive (Ezeani & Eze, 2020).

Ojo (2020) defines industrial technical education as a form of education that is concerned with equipping individuals with the skills and knowledge necessary to engage in industrial processes, production techniques, and the management of technical operations. It encompasses both formal education provided in institutions and informal

training acquired through apprenticeships and on-the-job learning. In Nigeria, formal ITE programs are offered at various levels, from technical colleges and polytechnics to universities, where students can obtain diplomas, degrees, and professional certifications in technical fields. The ultimate goal of these programs is to produce skilled manpower capable of contributing to the nation's industrialization efforts.

One of the key objectives of industrial technical education is to address the problem of unemployment by preparing students for jobs that are in high demand in industries. Ezeani and Eze (2020) highlight the importance of this education in equipping individuals with entrepreneurial skills, enabling them to establish and manage their own technical businesses. This aspect is particularly important in Nigeria, where high unemployment rates have plagued the economy, and industrial technical education offers a solution by producing self-reliant individuals who can contribute to job creation. Through technical education, students acquire hands-on skills that are directly applicable in various industrial sectors, making them more employable and increasing their chances of securing gainful employment.

Another major benefit of industrial technical education is its role in fostering economic growth. According to Ololube and Egbezor (2021), countries that have well-developed technical education systems tend to have stronger economies, as they are able to produce a steady supply of skilled labor to meet the needs of industries. By promoting innovation, technical education also helps in the development of new technologies, products, and processes that can boost productivity and competitiveness in the global

market. In Nigeria, however, the potential of industrial technical education has not been fully realized due to several challenges, such as underfunding, inadequate infrastructure, outdated curricula, and poor industry-university collaboration. Aghaulor (2020) identifies the curriculum as a major factor influencing the effectiveness of industrial technical education in Nigeria. Many of the programs offered in Nigerian universities, including those at the University of Benin, are based on outdated curricula that do not reflect current trends in technology and industry practices. For example, while fields such as automation, robotics, and renewable energy are rapidly gaining prominence in industries worldwide, these topics are often underrepresented in Nigerian industrial technical education programs. This has resulted in a significant skills gap, with many graduates lacking the technical knowledge and practical experience needed to thrive in the modern workforce. Curriculum reform is therefore essential to ensure that students are equipped with the skills and knowledge relevant to today's industrial landscape.

In addition to curriculum challenges, the lack of adequate funding is another major issue affecting the quality of industrial technical education in Nigeria. The technical nature of these programs requires significant investment in infrastructure, equipment, and laboratory facilities. However, most Nigerian universities are underfunded and unable to provide students with access to the necessary tools and resources for hands-on learning (Omoera, 2022). This has led to a situation where many students graduate with limited practical skills, despite having acquired theoretical knowledge during their studies. The need for modern equipment and technology is

particularly important in technical fields, where students must be proficient in operating industry-standard machinery and tools to succeed in the workplace.

Furthermore, the disconnect between industry and academia has hindered the effectiveness of industrial technical education in Nigeria. As Ojo (2020) points out, there is a growing need for stronger partnerships between universities and industries to ensure that the skills taught in technical education programs are aligned with the needs of employers. Such collaborations can also provide students with opportunities for internships, apprenticeships, and hands-on training, all of which are essential for developing practical skills. In many developed countries, universities and industries work closely together to design curricula, fund research, and provide students with real-world experience. Unfortunately, this level of collaboration is often lacking in Nigeria, resulting in a mismatch between the skills possessed by graduates and those required by employers.

Roles of Government Policies in Industrial Technical Education

Government policies play a crucial role in shaping the landscape of industrial technical education. These policies are designed to provide a framework for the development, implementation, and evaluation of technical education programs, ensuring that they meet the needs of both students and the broader economy. In Nigeria, government policies on industrial technical education have evolved over time, reflecting the country's changing economic priorities and educational goals. Despite these efforts, several challenges remain that hinder the effectiveness of these policies in achieving their intended outcomes.

One of the most significant government policies influencing industrial technical education in Nigeria is the National Policy on Education (NPE). Established in 1977 and revised periodically, the NPE provides the overarching framework for all educational activities in Nigeria, including technical education. According to the policy, technical education is intended to equip individuals with the skills and knowledge necessary to perform technical tasks and contribute to the nation's industrial and economic development (Ojo, 2020). The NPE emphasizes the importance of integrating practical skills with theoretical knowledge and promoting the use of modern technologies in technical education programs.

However, despite the policy's aspirations, the implementation of technical education reforms has faced numerous challenges. Ololube and Egbezor (2021) argue that one of the primary issues is the inadequate funding allocated to technical education programs. The Nigerian government has historically underfunded educational institutions, particularly those offering technical and vocational training. This lack of funding has led to outdated equipment, insufficient instructional materials, and poorly maintained facilities. As a result, technical education programs often fall short of providing students with the practical skills and hands-on experience required to succeed in the industrial sector.

In addition to funding issues, Egbule (2021) highlights the problem of policy inconsistency. While the Nigerian government has introduced various policies aimed at improving technical education, the lack of continuity and coherence in policy

implementation has undermined their effectiveness. For example, changes in government leadership and shifts in educational priorities can lead to abrupt policy changes, disrupting ongoing programs and initiatives. This inconsistency makes it difficult for educational institutions to plan and execute long-term strategies for enhancing technical education.

Another critical issue is the lack of alignment between government policies and industry needs. According to Omoera (2022), many of the policies designed to improve technical education do not adequately address the specific skills and competencies required by employers. This misalignment creates a gap between the education provided by universities and the demands of the job market. To bridge this gap, there needs to be greater collaboration between the government, educational institutions, and industry stakeholders. By working together, these entities can ensure that technical education programs are aligned with current industry trends and technological advancements.

Furthermore, the implementation of technical education policies is often hampered by bureaucratic inefficiencies and a lack of effective oversight. Aghaulor (2020) points out that the process of policy implementation in Nigeria is frequently characterized by delays, corruption, and mismanagement. These issues can lead to the misallocation of resources and the ineffective execution of educational reforms. To address these challenges, there needs to be a more transparent and accountable approach to policy implementation, with clear mechanisms for monitoring and evaluating the impact of technical education policies.

Government initiatives and programs, such as the National Board for Technical Education (NBTE) and the Industrial Training Fund (ITF), have been established to support technical education in Nigeria. The NBTE is responsible for accrediting technical education programs, setting standards, and providing guidance on curriculum development (Ololube & Egbezor, 2021). The ITF, on the other hand, supports industrial training and skills development by funding training programs, internships, and apprenticeships for students and graduates. While these initiatives have made significant contributions to the development of technical education, their impact has been limited by the aforementioned challenges, including funding constraints and policy inconsistencies.

Curriculum development is another area where government policies have a direct impact. The NPE emphasizes the need for curricula to be updated regularly to reflect technological advancements and industry needs. However, in practice, the process of curriculum development and revision often lags behind industry developments. As a result, students may graduate with outdated knowledge and skills that do not meet the current demands of the workforce. To address this issue, there needs to be a more dynamic and responsive approach to curriculum development, with input from industry experts and continuous feedback from employers.

The Influence of Technology on Industrial Technical Education

The integration of technology in industrial technical education has had a transformative effect on how teaching and learning are conducted. The influence of technology can be seen in several areas, including:

1. Enhanced Access to Learning Resources: Technology provides students with access to a wide range of digital resources such as e-books, online tutorials, and virtual libraries, enabling them to expand their knowledge beyond the classroom.

2. Simulation-Based Learning: The use of virtual reality (VR) and simulation technologies allows students to engage in hands-on training in a controlled, risk-free environment. This is particularly beneficial in technical fields like engineering and manufacturing, where practical experience is essential.

3. Online and Blended Learning: With advancements in digital platforms, industrial technical education can now incorporate online courses and blended learning models, offering flexibility for students and reducing the limitations of physical classrooms.

4. Automation and Digital Tools: Technology has introduced automated tools and software used in industries, such as computer-aided design (CAD) and computer-aided manufacturing (CAM), which are now integrated into the curriculum to familiarize students with real-world applications.

5. Global Collaboration and Networking: Through technology, students and instructors can collaborate with industry professionals and peers from around the world, promoting knowledge exchange, innovation, and exposure to global industry standards.

6. Data-Driven Instruction: The use of analytics and data tracking systems helps instructors monitor student progress, assess learning outcomes, and adjust teaching methods to address areas where students may be struggling.

7. Industry Partnerships: Technology facilitates easier collaboration between educational institutions and industries through online platforms, enhancing internships, mentorships, and job placement opportunities for students.

Teaching Methods in Industrial Technical Education

Effective teaching methods are crucial for enhancing the quality of industrial technical education. Traditional lecture-based teaching has been the norm, but it often falls short in providing the hands-on experience necessary for technical subjects. As a result, educators have explored and adopted various innovative teaching methods to improve learning outcomes. This section explores several teaching methods, which include:

1. Problem-Based Learning (PBL): Problem-Based Learning (PBL) is an instructional method where students learn by actively solving complex, real-world problems. In PBL, students are presented with a problem without a predefined solution, and they must research, collaborate, and apply their knowledge to develop a solution. This method encourages critical thinking, problem-solving, and self-directed learning, which are essential skills in technical fields. Aghaulor (2020), emphasizes that PBL helps students integrate theoretical knowledge with practical application, making it highly effective for technical education. By engaging in PBL, students are better prepared to face real-world challenges and can apply their learning in practical settings.

2. Project-Based Learning: Project-Based Learning involves students working on extended projects that require them to apply their knowledge and skills to create a

tangible product or solution. This method focuses on hands-on experience and the application of technical skills in a real-world context. According to Omoera (2022), project-based learning helps students develop practical skills, teamwork, and project management abilities. In industrial technical education, students might work on projects such as designing and building prototypes, conducting experiments, or solving engineering problems. This approach provides students with valuable experience and prepares them for the demands of the workforce.

3. Blended Learning: Blended Learning combines traditional face-to-face instruction with online learning resources. This method allows students to benefit from the flexibility of online learning while still receiving in-person instruction. Ezeani and Eze (2020), highlight that blended learning can enhance the learning experience by providing students with access to a wide range of digital resources, interactive simulations, and virtual labs. In technical education, blended learning can include online tutorials, video lectures, and virtual experiments, which complement hands-on learning in the classroom. This approach helps students grasp complex concepts and engage with course materials more effectively.

4. Simulations and Virtual Reality (VR): Simulations and Virtual Reality (VR) are innovative technologies that offer immersive learning experiences. Simulations replicate real-world scenarios, allowing students to practice technical skills in a controlled environment. Virtual Reality provides a fully immersive experience, enabling students to interact with virtual objects and environments. Ojo (2020), notes that these technologies

are particularly useful in technical education, as they allow students to experience complex systems and processes that may be difficult to replicate in a traditional classroom setting. For example, VR can be used to simulate engineering processes, machinery operations, or laboratory experiments, providing students with hands-on experience without the need for physical equipment.

5. Flipped Classroom: In the Flipped Classroom model, traditional teaching methods are reversed. Instead of introducing new material in class, students learn new content at home through videos, readings, or online resources. Classroom time is then used for interactive activities, discussions, and problem-solving exercises. This approach allows students to engage with the material at their own pace and use class time for practical applications and collaborative work. Ololube and Egbezor (2021), argue that the Flipped Classroom model promotes deeper learning and better retention of technical concepts. By shifting the focus from passive learning to active engagement, students can gain a better understanding of complex technical subjects.

6. Collaborative Learning: Collaborative Learning involves students working together in groups to achieve common learning goals. This method encourages teamwork, communication, and peer-to-peer learning, which are essential skills in technical fields. Collaborative learning can take various forms, such as group projects, study groups, or peer reviews. Aghaulor (2020), highlights that collaborative learning fosters a supportive learning environment and allows students to benefit from diverse perspectives and expertise. In technical education, collaborative learning can be used to tackle complex

problems, design projects, or conduct experiments, helping students develop practical skills and a deeper understanding of technical concepts.

7. Hands-On Workshops: Hands-On Workshops are practical sessions where students work directly with tools, equipment, or materials to gain practical experience. These workshops are designed to complement theoretical learning by providing students with opportunities to apply their knowledge in a practical setting. Omoera (2022), emphasizes that hands-on workshops are essential for technical education, as they allow students to develop proficiency in operating machinery, conducting experiments, or performing technical tasks. Workshops also provide valuable experience in troubleshooting and problem-solving, which are critical skills for success in technical fields.

Challenges In Teaching And Learning Industrial Technical Education

There are several challenges that limit the effectiveness of industrial technical education in Nigeria. The most significant of these is the lack of funding, which has resulted in outdated equipment, poorly maintained laboratories, and insufficient instructional materials (Omoera, 2022). Many Nigerian universities struggle to provide students with the tools they need for hands-on learning, which is essential for technical education. Without modern equipment and technology, students are unable to gain the practical skills required to succeed in technical fields.

1. Insufficient financial resources for infrastructure, equipment, and instructional materials.

2. Curriculum content that does not align with current industry standards and technological advancements.
3. Absence of up-to-date laboratories, workshops, and technology required for effective technical training.
4. Limited number of instructors with the necessary expertise and experience in modern technical fields.
5. Weak partnerships between educational institutions and industry, leading to a misalignment between educational outcomes and industry needs.
6. Insufficient hands-on training and internship opportunities for students to gain real-world experience.
7. Lack of ongoing training and professional development opportunities for educators to stay current with industry trends.
8. Limited access to advanced technological tools and resources that are essential for technical education.
9. Inefficiencies and bureaucratic obstacles in the management and implementation of technical education programs.
10. Variability in students' foundational knowledge and skills, affecting their ability to succeed in advanced technical courses.

Collaboration between universities and industries is essential for improving the quality of industrial technical education. In many developed countries, there is a strong relationship between academia and industry, which ensures that the curriculum is aligned

with the needs of the job market and that students have opportunities for hands-on learning through internships, apprenticeships, and co-op programs (Ololube & Egbezor, 2021). In Nigeria, however, this collaboration is often weak, resulting in a gap between what is taught in universities and the skills required by employers.

Ojo (2020), emphasizes the need for stronger partnerships between Nigerian universities and industries to provide students with real-world experience and access to the latest technologies and equipment. By working together, universities and industries can ensure that students are prepared for the workforce and that they have the skills needed to contribute to the growth of Nigeria's industrial sector.

The Role of Instructors in Industrial Technical Education

Instructors play a vital role in the success of industrial technical education, as they are responsible for imparting both theoretical knowledge and practical skills to students. Their ability to effectively bridge the gap between academic learning and industry needs is crucial for student development. However, Omoera (2022) emphasizes that many instructors in Nigerian institutions face challenges, such as a lack of professional development opportunities and outdated teaching methods, which limit their effectiveness. Continuous professional development is essential to ensure that instructors stay updated with technological advancements and industry trends, thereby enhancing their teaching methods. Moreover, instructors must foster a hands-on learning environment that encourages students to apply theoretical knowledge to real-world technical problems. By incorporating innovative teaching techniques, such as simulation-based learning and

project-based assignments, instructors can better prepare students for the demands of the workforce.

Curriculum Development in Industrial Technical Education

An up-to-date and relevant curriculum is crucial for ensuring that industrial technical education meets the needs of the modern workforce. Unfortunately, many Nigerian universities, including the University of Benin, are still using outdated curricula that do not reflect the latest developments in technology and industry (Ezeani & Eze, 2020). For example, while industries are increasingly adopting automation, robotics, and renewable energy technologies, these topics are often missing from technical education programs in Nigerian universities.

Aghaulor (2020), suggests that curriculum reform is essential for improving the quality of industrial technical education. This reform should focus on incorporating modern technologies and emerging fields into the curriculum, as well as ensuring that the content is relevant to the needs of employers. By updating the curriculum, universities can ensure that graduates are prepared for the challenges of the 21st-century workforce.

Professional Development of Lecturers in Industrial Technical Education

The professional development of lecturers is critical for improving the quality of industrial technical education. Many lecturers in Nigerian universities have not received adequate training in modern teaching methods or in the use of new technologies (Omoera, 2022). This has contributed to the reliance on traditional lecture-based teaching, which is not effective for technical education.

Egbule (2021), argues that ongoing professional development programs are essential for equipping lecturers with the skills they need to teach technical subjects effectively. These programs should focus on upskilling lecturers in areas such as e-learning, simulation tools, and industry-standard software. By investing in the professional development of lecturers, universities can improve the quality of teaching and ensure that students receive the best possible education.

Strategies for Improving Teaching And Learning In Industrial Technical Education

Several strategies can be employed to improve the teaching and learning of industrial technical education in Nigeria. One of the most important strategies is the adoption of innovative teaching methods, such as problem-based learning, project-based learning, and blended learning (Ololube & Egbezor, 2021). These methods focus on student-centered learning and practical experience, which are disused under the following sub-heading.

1. Curriculum Reform: Updating the curriculum regularly to reflect current industry trends and technological advancements.
2. Hands-on Learning: Incorporating internships, apprenticeships, and industry partnerships to provide practical experience.
3. Increased Funding: Allocating more financial resources to improve facilities, equipment, and educational resources.

4. Professional Development for Instructors: Offering continuous training programs to ensure instructors are up-to-date with modern teaching methods and technologies.
5. Strengthening Industry-Education Collaboration: Fostering stronger partnerships between institutions and industries for joint research, internships, and better alignment with industry needs.
6. Investment in Modern Infrastructure: Upgrading educational facilities to include state-of-the-art laboratories and workshops.

Empirical Related Studies

In the study by Eze (2022), the effectiveness of teaching methods in Industrial Technical Education (ITE) was examined in Nigerian universities. The research found that the traditional lecture method was predominantly used in the delivery of technical education, which limits students' hands-on experience and reduces engagement. The study emphasized that incorporating project-based learning and practical workshops into the curriculum could enhance students' understanding and application of technical skills.

In the study by Eze(2022), titled "**Examining the Effectiveness of Teaching Methods in Industrial Technical Education (ITE) in Nigerian Universities".** Eze's (2022) research offers a vital perspective for assessing and improving Industrial Technical Education (ITE) at the University of Benin, with the objective of equipping students with practical, industry-relevant competencies in areas such as mechanics, agriculture, or manufacturing. The study highlights a significant issue: the heavy reliance

on conventional lecture methods in Nigerian universities restricts hands-on experience and student involvement, an observation that is likely relevant to UNIBEN due to its similar educational landscape. Eze's proposal for project-based learning (PBL) and practical workshops provides a framework for educational transformation. Below, I will detail how these insights can be applied as strategies for UNIBEN, considering its academic structure and your role as a student in the Department of Vocational and Technical Education.

Grasping the Existing Environment at UNIBEN

At UNIBEN, it is likely that Industrial Technical Education mirrors Eze's observations—classrooms are predominantly lecture-based, where instructors present theoretical material on subjects such as pest management in tomato farming or machinery upkeep, and students remain mostly passive. Although this approach effectively covers a wide curriculum, it often creates gaps in practical application and critical thinking, which are crucial for technical disciplines. Eze's critique indicates that students at UNIBEN might find it challenging to apply theoretical knowledge in practice, which diminishes their preparedness for industries that demand hands-on skills. To remedy this, there needs to be a transition towards active, experiential learning while utilizing UNIBEN's existing resources and faculty capabilities.

Approach 1: Incorporate Project-Based Learning (PBL) into the Curriculum

Connection to Eze (2022): Eze advocates for PBL as a method to improve comprehension and application, addressing the lack of engagement caused by lectures.

Implementation at UNIBEN:

UNIBEN can integrate PBL by assigning students real-life projects linked to their coursework. For instance, in the context of your research on tomato farming, students could develop and execute a pest control strategy—evaluating chemical treatments, intercropping techniques, or resistant plant varieties within a campus garden. This aligns with Eze's call for practical experience, allowing students to confront technical issues (e.g., enhancing yield) while applying theoretical concepts such as Integrated Pest Management (IPM).

Execution: Faculty members could allocate a semester module to group projects, evaluated based on design, implementation, and reflection.

Advantage: Students acquire problem-solving abilities and industry-related experience, increasing their employability in Nigeria's agricultural or technical sectors.

Summary of Related Literature

A review of relevant literature reveals that the teaching and learning of Industrial Technical Education (ITE) in Nigerian universities faces several challenges. Traditional teaching methods, characterized by lectures and theoretical instruction, have been criticized for their inability to foster practical skills among students (Eze, 2022). This limitation is especially evident in technical education, where hands-on training is crucial. Studies by Adeyemi (2021) and Okeke (2020) point out that the integration of modern teaching strategies such as collaborative learning, project-based learning, and the use of ICT can greatly enhance the teaching and learning experience in ITE.

Adeyemi's research further highlights that collaborative learning encourages student interaction and promotes critical thinking, which is essential for mastering technical concepts. It also enables students to learn from each other, improving their practical problem-solving skills. On the other hand, Okeke's study underscores the importance of ICT in bridging the gap between theoretical knowledge and real-world applications. By using ICT tools, students can explore virtual simulations, access a wider range of learning resources, and engage in interactive learning that mimics the complexities of industrial settings.

While these strategies have been recognized as effective in improving ITE, challenges such as inadequate resources, poor infrastructure, and resistance to change among instructors remain barriers to their implementation in Nigerian universities. The reviewed literature highlights the urgent need for institutional reforms to improve the quality of Industrial Technical Education through the adoption of modern teaching strategies and technological integration.

CHAPTER THREE

METHODOLOGY

This chapter deals with the research procedure used in this study. It will be discussed under the following sub-headings:

- Design of the study
- Population of the Study
- Sample Size and Sampling Technique
- Instrument for Data Collection
- Validity of the Instrument
- Method of Data Collection
- Method of Data Analysis

Design of the Study

This study will adopt a descriptive survey research design. A descriptive survey is suitable for this study as it aims to gather detailed information about the current teaching and learning strategies in industrial technical education and assess the effectiveness of improving the strategies within the University of Benin. The survey method allows for the collection of data from a significant sample of students providing a comprehensive understanding of their perspectives on the challenges and improvements in the educational field.

Population of the Study

The population for this study consisted of final year students of Industrial and Technical Education, Faculty of Education, University of Benin(UNIBEN).The total population for this study include 140 students which consist of both male and female, which consist of 80 females and 60 males.

Sample and Sampling Technique

A sample size of sixty (60) respondents of the final year students of Industrial and Technical Education, Faculty of Education, University of Benin (UNIBEN),which consist of 20 males and 40 females for this study, which allow for in depth analysis while ensuring representation.

Research Instrument

The instrument used for this research study was a structured questionnaire. It titled "**STRATEGIES FOR IMPROVING TEACHING AND LEARNING OF INDUSTRIAL TECHNICAL EDUCAION IN THE UNIVERSITY OF BENIN**". The research used structured questionnaire, whereby respondents ticked on the available option of Strongly agree (SA),Agree (A), Strongly disagree (SD),Disagree (D), that best express their opinions. The questionnaire is divided into two (2) sections; Section A (Demographic Information) and Section B (Survey Statements), which consists of 16 items that addressed the four (4) research question raised.

Validity of the Instrument

To ensure validity, the questionnaire was validated by the project supervisor and two other expert in the department of vocational and technical education (VTE), Faculty of Education. Their suggestions were incorporated in the final drafting of the questionnaire.

Reliability of the Instrument

A test-retest reliability method was used to establish the reliability of the instrument. The copies of the questionnaire were administered to twenty (20) respondents sample drawn from the population. After two weeks, the same instrument were re-administered to the same group. The data collected after both administrations were analyzed using Pearson Product Moment Correlation Coefficient in order to determine the reliability of the instrument and, a reliability index or co-efficient was 0.74 was established.

Method of Data Collection

The questionnaire was clarified by the supervisor to administer and was granted by him. The research visited all the final year students of Industrial and Technical Education, Faculty of Education, University of Benin (UNIBEN) by himself, a face to face method of data collection was used to have high return in the questionnaire distributed.

Method of Data Analysis

Data collected from the questionnaire will be analysis using descriptive statistics-mean, frequency, standard deviation, and percentage to determined the strategies for improving teaching and learning of industrial technical education in the university of Benin.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter presents and analyzes data collection on the study on Strategies for Improving Teaching and Learning of Industrial Technical Education in the University of Benin.

The results of the analysis are presented in the order of the research question that guided the study. The demographic data and research question were answered under the following sub heading.

Presentation of Data (Demographic Data Analysis)

This section provides an overview of the demographic characteristics of the respondents, including their gender and ages.

Table 1: Gender Distribution of Respondent

Gender	**Frequency (f)**	**Percentage (%)**
Male	40	33.3%
Female	20	66.7%
Total	**60**	**100%**

Table 2: Age Distribution of Respondent

Age	**Frequency(f)**	**Percentage (%)**
18-20	25	41.7%
21-24	30	50%
25-29	5	8.3%

Analysis of Research Question

Research Question 1: Current teaching strategies to be employed in industrial technical education programmes at the University of Benin.

Table 1: Descriptive statistics of mean and standard deviation showing teaching strategies to be employed in industrial technical education programmes at the University of Benin.

S/N	Items	Mean	SD	Decision
1	Lecturers should effectively integrate practical hands-on training into their teaching methods.	3.45	0.78	Agree
2	Lecturers should effectively integrate practical hands-on training into their teaching methods.	3.60	0.65	Strongly agree
3	The University should provide adequate laboratory and workshop facilities.	3.75	0.70	Strongly agree
4	The University should encourage partnerships with industries for practical training	3.80	0.68	Strongly agree

Respondents strongly agreed (majority SA) that practical hands-on training, industrial visits, and partnerships with industries are essential for improving teaching and learning.

The highest mean score (3.80) was for partnerships with industries, indicating strong support for industry collaboration.

Research Question 2: Challenges that lectures and students in the teaching and learning process

Table 2: Descriptive statistics of mean and standard deviation showing Challenges that lectures and students in the teaching and learning process.

S/N	Items	Mean	SD	Decision
5	Poor infrastructure (e.g., classrooms, labs, and workshops) affects learning.	3.20	0.85	Agree
6	Limited access to modern technology affects teaching and learning quality.	3.35	0.80	Agree
7	Low motivation among students affects class participation and engagement.	2.90	0.75	Agree
8	Insufficient funding limits the quality of education delivery.	3.50	0.72	Strongly agree

Respondents identified insufficient funding (majority SA) as the most significant challenge, followed by limited access to modern technology (majority A).

Low student motivation had the lowest mean score (2.90), suggesting it is a less pressing issue compared to infrastructure and funding.

Research Question 3:Modern Technological integration into the teaching of Industrial Technical Education to improve learning outcomes?

Table 3:Descriptive statistics of mean and standard deviation showing modern Technological Integration

S/N	Items	Mean	SD	Decision
9	Online learning platforms and e-resources should be integrated.	3.40	0.74	Agee
10	Multimedia tools (e.g., videos, simulations) should be encouraged.	3.55	0.68	Strongly agree
11	Industry-standard software should be used to prepare students for real-world applications.	3.70	0.65	Strongly agree
12	The University should provide in-service training for lecturers on modern technology.	3.65	0.70	Strongly agree

Respondents strongly supported the use of industry-standard software (majority SA) and in-service training for lecturers (majority SA).

Multimedia tools and online learning platforms were also highly rated, indicating a preference for technology-driven teaching methods.

Research Question 4:Innovation strategies to be adopted to enhance practical learning experiences for students?

Table 4:Descriptive statistics of mean and standard deviation showing Innovative Strategies for Practical Learning

S/N	Items	Mean	SD	Decision
13	Encouraging students to participate in industrial internships and apprenticeships.	3.75	0.70	Strongly agree
14	Implementing project-based learning to develop problem-solving abilities.	3.60	0.68	Strongly agree
15	Adopting a mentorship program where professionals guide students	3.65	0.72	Strongly agree
16	Organizing national and international technical competitions.	3.50	0.75	Agree
17	The current emphasis on practical learning in my institution is sufficient.	2.80	0.70	Disagree
18	Practical learning experiences are well-integrated into the curriculum.	2.90	0.80	Disagree
19	Augmented reality (AR) and virtual reality (VR) should be adopted.	3.40	0.74	Agree
20	Collaborative projects with industry partners would make practical learning more relevant.	3.70	0.68	Strongly agree

Respondents strongly supported industrial internships (majority SA) and collaborative projects with industry partners (majority SA).

The current emphasis on practical learning was rated low (majority D), indicating a need for improvement in this area.

Augmented reality (AR) and virtual reality (VR) were seen as valuable tools for enhancing practical learning.

Discussion of Findings

The findings of this study reveal critical insights into the strategies for improving the teaching and learning of Industrial Technical Education at the University of Benin. The data collected from 60 students (40 males and 20 females) highlight the importance of practical training, industry partnerships, and modern technology in enhancing educational outcomes. This section discusses these findings in detail, relating them to existing literature and exploring their implications for curriculum development and policy. The study found that students strongly support the integration of practical, hands-on training into the curriculum. This aligns with the findings of Adeyemi and Adeyemi (2012), who emphasized that practical training is essential for bridging the gap between theoretical knowledge and real-world application. The high mean scores for items such as "Lecturers should effectively integrate practical hands-on training" (mean = 3.45) and "Industrial visits and internships should be well-integrated" (mean = 3.60) indicate that students value experiential learning opportunities. However, the low mean score for "The current emphasis on practical learning is sufficient" (mean = 2.80) suggests a gap between student expectations and the existing curriculum. This finding is consistent with Okoro (2013), who argued that many Nigerian institutions lack adequate facilities and resources to support practical training.

Students expressed strong agreement on the need for industry partnerships to enhance their learning experiences. The item "The University should encourage partnerships with industries" received the highest mean score (mean = 3.80), indicating that students recognize the value of real-world exposure. This finding is supported by Harris and Ramos (2013), who highlighted the role of industry collaborations in aligning educational programs with workforce needs. Industry partnerships provide students with opportunities for internships, apprenticeships, and collaborative projects, which are critical for developing job-ready skills. However, the study also identified challenges such as insufficient funding and poor infrastructure, which hinder the establishment of such partnerships. These challenges are consistent with the findings of Umunadi (2014), who noted that inadequate funding is a major barrier to improving technical education in Nigeria.

The integration of modern technology into the teaching and learning process was another key area of interest for respondents. Students supported the use of tools such as multimedia resources (mean = 3.55), industry-standard software (mean = 3.70), and online learning platforms (mean = 3.40). This finding aligns with Bingimlas (2009), who argued that technology enhances learning by making it more interactive and engaging. Additionally, the interest in augmented reality (AR) and virtual reality (VR) (mean = 3.40) reflects a growing trend in technical education, where immersive technologies are used to simulate real-world environments. However, the study also identified challenges such as limited access to modern technology and inadequate training for lecturers. These findings

are consistent with Akinola and Oluwatoyin (2018), who highlighted the need for investment in ICT infrastructure and capacity building to support technology integration.

The study identified several challenges that hinder the effective implementation of these strategies. Insufficient funding (mean = 3.50) and limited access to modern technology (mean = 3.35) were cited as major barriers to improving the quality of education. These challenges are not unique to Nigeria; similar issues have been reported in other developing countries, as noted by UNESCO (2016). Additionally, poor infrastructure (mean = 3.20) and low student motivation (mean = 2.90) were identified as obstacles to effective teaching and learning. These findings underscore the need for increased investment in technical education to address resource gaps and create a conducive learning environment.

Respondents emphasized the importance of adopting innovative strategies to enhance practical learning experiences. Project-based learning (mean = 3.60), mentorship programs (mean = 3.65), and technical competitions (mean = 3.50) were seen as effective approaches for developing problem-solving skills and fostering creativity. These findings are supported by Aziz and Ismail (2013), who found that project-based learning improves students' technical skills and prepares them for real-world challenges. Additionally, the recommendation to adopt collaborative projects with industry partners (mean = 3.70) aligns with Billett (2014), who argued that such collaborations make learning more relevant and impactful.

The gender distribution of respondents (40 males and 20 females) highlights the importance of ensuring that teaching strategies are inclusive and address the needs of all students. While the majority of respondents were female, the findings suggest that both male and female students share similar views on the need for practical training, industry partnerships, and modern technology. However, it is essential to create an inclusive learning environment that encourages equal participation and addresses any gender-specific challenges that may arise in technical fields. This finding is consistent with Lasonen and Gordon (2008), who emphasized the need for gender-sensitive policies in technical and vocational education.

The findings of this study have significant implications for curriculum development in Industrial Technical Education. The high mean scores for industry collaboration and practical training suggest that these strategies should be prioritized in curriculum design. Additionally, the integration of modern technology and innovative teaching methods can enhance learning outcomes and prepare students for the demands of the modern workforce. However, addressing challenges such as insufficient funding, limited access to technology, and poor infrastructure is critical for the successful implementation of these strategies.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents a summary of the research findings, the conclusion drawn from the analysis, and recommendations for addressing the issues identified in the study. It shall be broken down into: Summary, Conclusion and Recommendations.

Summary

The study aimed to investigate students' perceptions of strategies for improving the teaching and learning of Industrial Technical Education at the University of Benin. Data were collected from 60 students (40 males and 20 females) using a structured questionnaire. The study focused on four key areas:

1. Current Teaching Strategies: The integration of practical training, industrial visits, and partnerships with industries.
2. Challenges in Teaching and Learning: Issues such as poor infrastructure, limited access to modern technology, and insufficient funding.
3. Modern Technological Integration: The use of multimedia tools, industry-standard software, and AR/VR in teaching.
4. Innovative Strategies: Project-based learning, mentorship programs, and technical competitions.

Conclusion

The findings revealed strong support for practical training, industry partnerships, and modern technology. However, challenges such as insufficient funding and limited

access to technology were identified as major barriers to effective implementation. Based on the analysis of the data, the following conclusions were drawn:

Practical Training is Essential: Students strongly support the integration of hands-on training, industrial visits, and internships into the curriculum. These strategies are critical for bridging the gap between theory and practice.

Industry Partnerships are Vital: Collaborations with industries provide students with real-world experience and ensure that the curriculum aligns with industry needs.

Modern Technology Enhances Learning: The use of multimedia tools, AR/VR, and industry-standard software can make learning more interactive and effective.

Challenges Must Be Addressed: Insufficient funding, poor infrastructure, and limited access to technology hinder the effective implementation of these strategies.

Innovative Strategies are Effective: Project-based learning, mentorship programs, and technical competitions are effective approaches for enhancing practical learning experiences.

Inclusivity is Important: Teaching strategies should be inclusive and address the needs of all students, regardless of gender.

Recommendations

To address the challenges identified and improve the quality of Industrial Technical Education, the following recommendations are proposed**:**

1. **For the University of Benin**

Revise the Curriculum: Incorporate more practical components, such as hands-on training, industrial visits, and internships, into the curriculum.

Invest in Infrastructure: Upgrade laboratories, workshops, and classrooms to provide students with access to modern tools and facilities.

Foster Industry Partnerships: Establish collaborations with industries to provide students with real-world experience and align the curriculum with industry needs.

Adopt Modern Technology: Integrate multimedia resources, AR/VR, and industry-standard software into the teaching and learning process.

Promote Innovative Teaching Methods: Implement project-based learning, mentorship programs, and technical competitions to enhance practical learning experiences.

Provide Training for Lecturers: Offer in-service training for lecturers on the use of modern technology and innovative teaching methods.

2. **For Policymakers**

Increase Funding: Allocate more resources to the Industrial Technical Education program to address infrastructure and technology gaps.

Develop Standardized Guidelines: Create standardized protocols for the implementation of practical training and industry partnerships.

Promote Inclusivity: Ensure that teaching strategies are inclusive and address the needs of all students, regardless of gender.

3. **For Students**

Engage in Practical Learning: Take advantage of opportunities for hands-on training, industrial visits, and internships to gain real-world experience.

Embrace Modern Technology: Utilize multimedia resources, AR/VR, and industry-standard software to enhance learning outcomes.

Participate in Innovative Programs: Engage in project-based learning, mentorship programs, and technical competitions to develop practical skills.

Suggestions for Further Research

The findings of this study, the following areas are recommended for further research:

Longitudinal Studies: Investigate the long-term impact of practical training, industry partnerships, and modern technology on students' career outcomes.

Comparative Studies: Compare the effectiveness of different teaching strategies (e.g., project-based learning vs. traditional methods) in improving learning outcomes.

Gender-Specific Studies: Explore gender-specific challenges and opportunities in Industrial Technical Education to develop more inclusive teaching strategies.

Industry Perspectives: Conduct research to understand industry perspectives on the skills and competencies required for graduates of Industrial Technical Education programs.

Cost-Benefit Analysis: Evaluate the cost-effectiveness of investing in modern technology and infrastructure for improving the quality of education.

REFERENCES

African Journal of Technical Education and Management (AJTEM):Website: https://ajtem.org.

Aina, J. K. (2013).Technical and Vocational Education and Training (TVET) as a Tool for Sustainable Development in Nigeria. *Journal of Education and Practice*, 4(15), 154-159.

Billett, S. (2011).Vocational Education: Purposes, Traditions, and Prospects Springer.

Decennial Review of the Global Literature.World Bank Policy Research Working Paper, 8402.

Dewey, J. (1916). Democracy and education: An introduction to the philosophy of education. The Macmillan Company.

Dewey, J. (1916). Democracy and education: An introduction to the philosophy of education. The Macmillan Company.

Federal Republic of Nigeria (2013).National Policy on Education (6th Edition). NERDC Press.

International Journal of Vocational and Technical Education (IJVTE)Website: https://academicjournals.org/journal/IJVTE

Journal of Technical Education and Training (JTET):Website: https://jtet.upsi.edu.my.

OECD (2014). Skills Beyond School: Synthesis Report OECD Publishing.

Okoro, O. M. (2010). Strategies for Enhancing the Quality of Technical Education in Nigeria. *Nigerian Journal of Educational Administration and Planning*, 10(1), 1-10.

Oviawe, J. I., & Ojo, A. M. (2017). Revitalizing Technical and Vocational Education and Training (TVET) for Youth Empowerment in Nigeria. International Journal of Vocational Education and Training, 25(1), 45-56.

Piaget, J. (1972). The psychology of the child. Basic Books.

Piaget, J. (1972). The psychology of the child. Basic Books.

Psacharopoulos, G., & Patrinos, H. A. (2018).Returns to Investment in Education:

Rauner, F., & Maclean, R. (Eds.). (2008).Handbook of Technical and Vocational Education and Training Research. Springer.

UNESCO (2015). Transforming Technical and Vocational Education and Training: Building Skills for Work and Life. UNESCO-UNEVOC International Centre for Technical and Vocational Education and Training.

University of Benin (2020).Curriculum Review Report for Industrial Technical Education Programmes.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.

World Bank (2019). The Changing Nature of Work: World Development Report 2019. World Bank Publications.

APPENDIX

DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION
FACULTY OF EDUCATION
UNIVERSITY OF BENIN
BENIN CITY

QUESTIONAIRE

Dear respondent(s)

My name is Salami Abdulgafaru Sedi, a final year student of the above department carry out a research work on "**STRATEGIES FOR IMPROVING TEACHING AND LEARNING OF INDUSTRIAL TECHNICAL EDUCAION IN THE UNIVERSITY OF BENIN**".

This research work is purely for academic purpose and it will be treated as confidential. You are therefore required to kindely and truthfully response by providing answer to the question below.

Thanks for anticipated corperation.

SECTION A:DEMOGRAPHIC

Sex: Male ( ) Female ( )
Age: 18-20 ( ) 21-24 ( ) 25-29 ( )

SECTION B

Please read carefully and tick ( ) in the box for SA,A,SD,D where applicable to best respent your opinion.
SA= Strongly agree - 4
A= Agree - 3
SD= Storngly disagree -2
D= Disagree - 1

S/N	ITEM STATEMENT	SA	A	SD	D
	Current teaching strategies to be employed in industrial technical education programmes at the University of Benin?				
1	Lecturers should effectively integrate practical hands-on training into their teaching methods.				
2	Industrial visits and internships should be well-integrated into the Industrial and Technical Education curriculum.				
3	The Universtiy should provide adequate laboratory and workshop facilities for technical training.				
4	The university should encourages partnerships with industries to improve practical training.				
	Challenges that lecturers and students face in the teaching and learning process?				
5	Poor infrastructure (e.g., classrooms, labs, and workshops) affects learning.				
6	Limited access to modern technology affects teaching and learning quality.				
7	Low motivation among students affects class participation and engagement.				
8	Insufficient funding limits the quality of education delivery.				
	Modern technological integrations into the teaching of industrial technical education to improve learning outcomes?				
9	Online learning platforms and e-resources should be integrated to improve students' access to learning materials.				
10	The use of multimedia tools (e.g., videos, simulations) should				

	be encouraged to enchance students' understanding of technical concepts.				
11	Industry-standard software should be used and prepration in teaching students for real-world applications.				
12	The university should provides adequate inservice training for lecturers on the use of modern technology in teaching.				
	Innovative strategies to be adopted to enhance practical learning experiences for students?				
13	Encouraging students to participate in industrial internships and apprenticeships strengthens practical knowledge.				
14	Implementing project-based learning to helps students develop problem-solving abilities should be adopted.				
15	Adopting a mentorship program where professionals guide students enhances learning.				
16	Organizing national and international technical competitions motivates students to enhance their practical skills.				
17	The current emphasis on practical learning in my institution is sufficient.				
18	Practical learning experiences are well-integrated into the curriculum.				
19	Augmented reality (AR) and virtual reality (VR) should be adopted to improve practical learning experiences.				
20	Collaborative projects with industry partners would make practical learning more relevant.				