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BRIDGING THE TECHNICAL SKILLS GAP BETWEEN INDUSTRY NEEDS AND INDUSTRIAL TECHNOLOGY EDUCATION PROGRAMMES OFFERING IN PUBLIC UNIVERSITIES IN NIGERIA

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ABSTRACT

The growing mismatch between the technical skill requirements of industries and the competencies acquired by graduates of Industrial Technology Education (ITE) programmes in Nigerian public universities has become a significant concern for educators, employers, and policymakers. This study examined the extent of the technical skills gap between industry expectations and the competencies developed through ITE programmes. It also identified the major factors contributing to this gap and explored strategies for bridging it. A descriptive survey research design was adopted for the study. The population comprised ITE lecturers at Nnamdi Azikiwe University, Awka, and selected Industry technical workers from industries in Nnewi, Anambra State. Data were collected using a structured questionnaire designed to assess perceptions of industry skill requirements and the level of technical competencies possessed by graduates. The data were analyzed using both descriptive and inferential statistical techniques. The findings revealed significant discrepancies between the technical skills required by industries and those acquired by graduates of ITE programmes. These gaps were largely attributed to factors such as outdated curricula, inadequate training facilities, limited opportunities for practical skill development, and weak collaboration between universities and industries. The study concludes that bridging the technical skills gap requires a more responsive and industry-oriented educational system. Specifically, strengthening curriculum relevance, improving training infrastructure, and fostering sustained partnerships between universities and industries are essential steps toward enhancing the quality of ITE in Nigeria. The study therefore recommends reforms aimed at improving graduate employability, strengthening industry-university collaboration, and supporting national industrial productivity.

Keywords: Technical skills gap, Industrial Technology Education, Industry requirements, Graduate employability.

Introduction

In recent years, there has been a growing expectation that university graduates should be "work-ready" upon entering the labour market. This expectation has intensified as the global labour market becomes increasingly competitive and dynamic. Employers now seek graduates who can contribute effectively to organizational productivity immediately after employment, without requiring extensive additional training. However, many organizations have reduced their investment in post-employment training due to the significant financial costs associated with workforce development (Abel, Deitz, & Su, 2014). Consequently, universities are increasingly expected to produce graduates who possess both technical competence and transferable workplace skills. Workplace readiness involves the acquisition of a broad range of

competencies beyond theoretical knowledge. While higher education institutions have traditionally emphasized the development of technical and disciplinary knowledge, industries are now demanding additional competencies such as critical thinking, communication, teamwork, creativity, problem-solving, leadership, entrepreneurship, and lifelong learning skills (Beard, Schwieger, & Surendran, 2008; Awodiji & Magogodi, 2023). These skills enable graduates to adapt effectively to the rapidly evolving technological and economic environments that characterize modern workplaces.

Globally, international organizations have emphasized the importance of aligning education systems with labour market needs. According to the International Labour Organization (ILO), the World Bank, and UNESCO, many technical and vocational education systems in developing countries struggle to match the skills required by industries, resulting in persistent labour market mismatches (ILO, World Bank, & UNESCO, 2023). These organizations highlight that rapid technological advancement, globalization, demographic changes, and digital transformation are reshaping workforce requirements, thereby necessitating continuous reforms in education and training systems. Technical skills remain central to professional competence, particularly in engineering and technology-related fields. These skills refer to the ability to effectively use tools, machines, equipment, and specialized techniques to perform tasks within a specific occupational domain. According to Fajaryati (2020), technical skills include the ability to service, repair, and maintain mechanical systems in accordance with established standards and manufacturer specifications. Similarly, Ejiofor (2015) defined technical skills as the specialized knowledge and practical abilities required to perform specific occupational tasks. Furthermore, technical skills encompass the analytical capacity to apply theoretical knowledge to solve practical problems. Okon (2019) noted that such skills include specialized knowledge, discipline-specific analytical competence, and the effective use of appropriate tools and techniques. Collectively, these competencies enable individuals to perform job-related responsibilities efficiently and contribute to organizational objectives.

In modern industrial economies, employers require workers who are technologically competent, innovative, and adaptable. Industries are increasingly focused on bridging the gap between academic knowledge and practical skills through technology-driven expertise. In addition to technical competence, employers demand digital literacy, data analysis capabilities, and entrepreneurial thinking to address emerging economic and technological challenges. This growing demand for relevant workforce skills has placed significant pressure on universities to align their academic programmes with industry needs. Academic institutions are now expected to produce graduates with “degrees with direction,” meaning qualifications that are closely linked to practical industry competencies. This alignment is particularly critical in technical fields, where practical skills play a vital role in productivity and innovation. Industrial Technology Education (ITE) is designed to prepare students for technical and industrial careers by equipping them with practical knowledge, technical competencies, and entrepreneurial skills necessary for employment or self-employment. Ideally, university programmes in Industrial Technology Education should produce graduates with the practical expertise required to meet industry standards and contribute to national industrial development. However, evidence from employers suggests a persistent mismatch between graduate competencies and industry requirements. Recent global reports indicate that many education systems continue to emphasize theoretical knowledge at the expense of practical skills, resulting in graduates who struggle to meet industry expectations (UNESCO, 2024). Similarly, studies on Technical and Vocational Education and Training (TVET) highlight that practical skill acquisition is a critical

factor in improving graduate employability and access to decent work (Emah, Doneys, Kusakabe, & Pathak, 2025).

This discrepancy between industry expectations and graduate competencies has led to what is commonly referred to as a skills gap. A skills gap is defined as the difference between the skills required by employers and those possessed by employees or job applicants. Kayode (2009) described it as the disparity between expected performance and actual performance within an organization. This gap becomes problematic when organizations are unable to achieve their objectives due to employees' lack of required competencies. Consequently, skills gaps can hinder productivity, innovation, and industrial competitiveness. In Nigeria, the issue of skills mismatch has become increasingly evident within the industrial sector. Many employers report difficulties in recruiting graduates with adequate practical technical skills for manufacturing, construction, and production activities. As a result, industries are often compelled to invest additional resources in retraining graduates before they can perform effectively in their roles. This situation has significant implications for economic development. UNESCO emphasizes that technical and vocational education and training plays a crucial role in equipping young people with the skills needed for employment, entrepreneurship, and lifelong learning, thereby contributing to the achievement of Sustainable Development Goals 4 (Quality Education) and 8 (Decent Work and Economic Growth). Despite the strategic importance of technical education, employers in Nigeria continue to report deficiencies in graduates' practical competencies. Specifically, graduates from Industrial Technology Education programmes are often found lacking in essential skills such as advanced fabrication, equipment troubleshooting, digital automation, maintenance management, and project-based problem-solving. These deficiencies suggest that many university programmes may place excessive emphasis on theoretical instruction rather than practical skill development.

The persistence of these challenges raises critical questions regarding the relevance of the Industrial Technology Education curriculum, the adequacy of training facilities, the effectiveness of teaching methods, and the level of collaboration between universities and industries. Without strong partnerships between academia and industry, students may lack adequate exposure to real industrial environments where practical skills are developed. Given these concerns, there is an urgent need to investigate the nature and extent of the technical skills gap between industry requirements and university training. Understanding the underlying causes of this gap is essential for developing effective strategies to improve the quality and relevance of Industrial Technology Education in Nigeria.

Statement of the Problem

Technical skills play a critical role in shaping students' future career opportunities and employability prospects. These skills influence graduates' performance during job interviews as well as their effectiveness in the workplace after securing employment (Chiamogu, 2025). Despite their importance, many Nigerian public universities appear to give insufficient attention to the systematic development of students' practical technical competencies. Furthermore, some universities either do not offer Industrial Technology Education programmes or lack adequate facilities, modern equipment, and strong industry partnerships necessary for effective skills training. Consequently, many students remain unaware of the level of technical competence required by employers in contemporary industrial environments. Reports from Nigerian industries consistently indicate that graduates of Industrial Technology Education programmes lack essential practical skills, including advanced fabrication, equipment troubleshooting, digital automation, maintenance management, and project-based technical

problem-solving. This situation highlights a significant disconnect between university training and the practical demands of industry. The persistence of this gap raises serious concerns regarding the relevance of the Industrial Technology Education curriculum, the adequacy of instructional resources, the effectiveness of teaching strategies, and the strength of collaboration between universities and industries in Nigeria. If this gap remains unaddressed, graduates may continue to experience unemployment or underemployment despite holding university degrees. Therefore, this study seeks to examine the technical skills gap between industry requirements and the training provided in Industrial Technology Education programmes public universities in Nigeria.

Purpose of the Study

The main purpose of the study is to examine the technical skills gap between industry needs and Industrial Technology Education offerings in public universities in Nigeria. Specifically, the study aims to:

1. Examine the technical skills required by industries in Nigeria.
2. Examine the technical skills currently provided by ITE programmes in public Universities.
3. Examine the causes of the gap between industry needs and the technical skills provided by ITE programmes in public Universities.
4. Examine the practical strategies to bridge the technical skills gap between industry requirements and ITE offerings in public Universities.

Research Questions

The following research questions guided the study;

1. What are the technical skills required by industries in Nigeria?
2. What are the technical skills currently provided by ITE programmes in public Universities?
3. What are the causes of the gap between industry needs and the technical skills provided by ITE programmes in public Universities?
4. What are the practical strategies to bridge the technical skills gap between industry requirements and ITE offerings in public Universities?

Hypotheses

The following null hypotheses guided the study

Ho_1 There is no significant difference between ITE Lecturers and Industry technical workers in their perceptions of the technical skills needs of industries in Nigeria.

Ho_2 There is no significant difference between ITE Lecturers and Industry technical workers in their perceptions for the technical skills currently provided by ITE offerings in public Universities.

Method

This study adopted a descriptive survey research design. A descriptive survey involves studying a group of people or items by collecting and analyzing data from a subset considered representative of the entire group, using questionnaires or interviews (Nworgu, 2015). This design was considered appropriate for eliciting responses from participants to assess the extent of the technical skills gap between industry needs and the competencies provided through ITE programmes in Nigerian public universities. The survey design enabled the researcher to collect

relevant data from both academic and industry stakeholders whose experiences are directly related to the subject under investigation. The population of the study comprised 1,200 personnel, including lecturers in ITE programmes at Nnamdi Azikiwe University, Awka, and Industry technical workers from selected industries in Nnewi who possess practical knowledge and technical skills required in the workplace. Due to logistical constraints associated with surveying the entire population, a proportionate stratified random sampling technique was employed to select 10% of the total population, resulting in a sample size of 120 respondents. This approach ensured that both academic and industry perspectives were adequately represented in the study. Data were collected using a validated structured questionnaire developed by the researcher. The instrument was designed to capture respondents' perceptions of the technical skills required by industries and the level of skills currently provided by Industrial Technology Education programmes. The questionnaire utilized a four-point rating scale: Very Large Extent (VLE) = 4, Large Extent (LE) = 3, Small Extent (SE) = 2, and Very Small Extent (VSE) = 1. The questionnaire was pre-tested on 10 respondents who were not part of the study population, drawn from Enugu State University of Science and Technology, Enugu. The scores obtained were subjected to an internal consistency reliability test using Cronbach's Alpha method, which yielded a reliability coefficient of 0.83. This was considered adequate, in line with Uzoagulu (2011), who indicated that a reliability index of 0.60 to 1.0 demonstrates high reliability. A total of 120 copies of the questionnaire were personally administered to the respondents by the researcher, with the assistance of four research assistants who had been briefed on the purpose of the study. All administered questionnaires were retrieved, representing a 100% response rate. The data collected were analyzed using both descriptive and inferential statistical techniques. Descriptive statistics, specifically the Industrial Required Mean (IRM) and Industrial Provided Mean (IPM) indices, were used to compare the technical skills required by industries with those provided by ITE programmes. These statistics were employed to answer the research questions. Additionally, inferential statistics using the independent samples t-test were conducted to test the study hypotheses at a 0.05 level of significance. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 22.

Results

The results of the study were presented below:

Research Question1: What are the technical skills required by industries in Nigeria?

Table 1: Analysis of means response of the technical skills required by industries in Nigeria.

S/N	Items	N	Xir	Xip	Xir-Xip	Remarks
1	Construction and building Technology skills.	120	3.82	2.71	1.11	A
2	Industrial technology skills	120	3.23	3.13	0.10	A
3	Information and communication technology skills	120	3.28	3.20	0.08	A
4	Engineering and manufacturing skills	120	3.60	3.44	0.16	A
5	Cross cutting technical competencies skills	120	3.09	2.98	0.11	A
6	Problem solving ability	120	3.06	2.88	0.18	A
7	Workshop safety and environmental compliance skills	120	2.83	2.62	0.21	A
8	Project management tools and equipment skills	120	2.75	2.44	0.31	A

9	Maintenance management skills.	120	3.06	2.58	0.48	A
	Key: A- Agree NA- Not Agreed					

The results presented in Table 1 indicate that all respondents agreed with the listed items, as the mean values for industry needs are higher than those for Industrial Technology Education provided. The differences in mean values, ranging from 0.08 to 1.11, suggest a close similarity in respondents' opinions. This implies a general consensus that industries in Nigeria require a range of competencies, including construction and building technology skills, industrial technology skills, information and communication technology skills, engineering and manufacturing skills, cross-cutting technical competencies, problem-solving abilities, workshop safety and environmental compliance skills, as well as project management tools and equipment skills.

Research Question 2: What are the technical skills currently provided by ITE programmes in public Universities?

Table 2: Analysis of means response of the technical skills currently provided by ITE offerings in public Universities.

S/N	Items	N	Xir	Xip	Xir-Xip	Remarks
10	Construction and building Technology skills.	120	2.21	3.32	-1.11	NA
11	Industrial technology skills	120	2.33	3.21	-0.88	NA
12	Information and communication technology skills	120	2.63	3.76	-1.13	NA
13	Engineering and manufacturing skills	120	2.12	3.02	-0.90	NA
14	Cross cutting technical competencies skills	120	2.02	3.04	-1.02	NA
15	Problem solving ability	120	2.06	3.13	-1.07	NA
16	Workshop safety and environmental compliance skills	120	3.76	2.82	0.94	A
17	Project management tools and equipment skills	120	3.12	2.23	0.89	A
18	Maintenance management skills.	120	3.02	2.00	1.02	A
	Key: A- Agree NA- Not Agreed					

The results in Table 2 show that the items 10-15 have mean values ranging from -0.88 to -1.13. This indicate that the Industries Requires mean value is less than Industrial Technology Education Provided mean value. The items 16-18 have mean values ranging from 0.89 to 1.02 which indicate that the Industries Requires mean value is more than Industrial Technology Education Provided mean value. This indicates that the respondents agree to some extent that ITE in public Universities do no provide Construction and building Technology skills, Industrial Technology skills, Information and communication technology skills, Engineering and manufacturing skills, Cross cutting Technical competencies skills, Problem solving ability, but provides workshop safety and environmental compliance skills, Project management tools and equipment skills

Research Question 3: What are the causes of the gap between industry needs and the technical skills provided by ITE programmes in public Universities?

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Table 3: Analysis of means response of the causes of the gap between industrial needs and technical skills provided by ITE programmes in public Universities.

S/N	Items	N	Xir	Xip	Xir-Xip	Remarks
19	ITE department lack of modern equipment.	120	3.72	2.63	1.09	A
20	Outdated Curriculum in place	120	3.32	2.21	1.11	A
21	No cooperation between industries and ITE	120	3.76	2.54	1.22	A
22	No provision for practical explosion for the students.	120	3.12	2.02	1.10	A
23	Most ITE staffs lack current industrial experiences.	120	3.02	2.04	0.98	A
24	No adequate funding for ITE	120	3.06	2.13	0.93	A
25	Period provided for industrial training is not adequate	120	3.76	2.82	0.94	A
	Key: A- Agree NA- Not Agreed					

The results in Table 3 show that the items 19-25 have mean values ranging from 0.93 to 1.22 indicating closeness in the opinions of respondents. This suggests that the respondents generally agree to some extent that the gap between industry needs and the technical skills provided by ITE programmes in public Universities is caused by several factors: ITE department lack of modern equipment, outdated curriculum in place, no cooperation between Industries and ITE , no provision for practical explosion for the students, most ITE staffs lack current industrial experiences, lack of adequate funding for ITE, period for provided for industrial is not adequate, No adequate workshop for suitable practical.

Research Question 4: What are the practical strategies to bridge the technical skills gap between industry requirements and ITE offerings in public Universities?

Table 4: Analysis of means response of the practical strategies to bridge the technical skills gab between the industry requirements and ITE offerings in public Universities.

S/N	Items	N	Xir	Xip	Xir-Xip	Remarks
26	ITE and industry partnership will close the skill gabs.	120	3.72	2.63	1.09	A
27	Involve industry professionals in curriculum review.	120	3.32	2.21	1.11	A
28	If more time is allotted to practical sections.	120	3.96	2.64	1.32	A
29	Lecturers should be exposed to industrial training.	120	3.12	2.02	1.10	A
30	Emerging technologies in practical training.	120	3.02	2.04	0.98	A
31	Adequate funding of ITE infrastructures.	120	3.06	2.13	0.93	A
32	Adopting more competency based practical education.	120	3.76	2.82	0.94	A
	Key: A- Agree NA- Not Agreed					

The results in Table 4 indicate that all respondents agreed with the listed items, as the mean values for industry needs are higher than those for Industrial Technology Education

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provision. The mean values, which range from 0.93 to 1.11, suggest a close similarity in respondents' opinions. This implies a general consensus among respondents regarding the practical strategies required to bridge the technical skills gap between industry needs and Industrial Technology Education offerings in public universities in Nigeria. These strategies include: establishing strong university–industry partnerships to minimize skill gaps; involving industry professionals in curriculum review; allocating more time to practical components of training; exposing lecturers to industry-based training; adopting emerging technologies in practical instruction; ensuring adequate funding of ITE infrastructure; and promoting a more competency-based approach to practical education.

Hypothesis 1: There is no significant difference between ITE Lecturers and Industry technical workers in their perceptions of the technical skills needs of industries in Nigeria.

Table 6: Summary of t-test Analysis of the mean ratings of ITE Lecturers and Industry technical workers in their perceptions of the technical skills needs of industries in Nigeria.

Variables	N	T	df	Sig. (2tailed)	Mean Difference	Std. Error Difference	Decision
Industrial Technology Education Lecturers	8	0.43	118	0.67	0.29	0.69	NS
Industrial Technical skill workers	112						

The result of t-test analysis in Table 6 shows that the t-value at 0.05 level of significance and 118 degree of freedom for the nine items is 0.43 with a significant value of 0.67. Since the significant value of 0.67 is more than the 0.05 level of significance the null hypothesis is not significant. This means that there is no significant difference between the mean ratings of ITE Lecturers and Industry technical workers in their perceptions of the technical skills needs of Industries in Nigeria.

Hypothesis 2: There is no significant difference between ITE Lecturers and Industry technical workers in their perceptions for the technical skills currently provided by ITE offerings in public Universities.

Table 7: Summary of t-test Analysis of the mean ratings of ITE Lecturers and Industry technical workers on the technical skills currently provided by ITE offerings in public Universities.

Variables	N	t	df	Sig. (2tailed)	Mean Difference	Std. Error Difference	Decision
Industrial Technology Education Lecturers	8	0.52	118	0.60	0.33	0.64	NS
Industrial Technical skill workers	112						

The result of t-test analysis in Table 4 shows that the t-value at 0.05 level of significance and 118 degree of freedom for the nine items is 0.52 with a significant value of 0.60. As the significant value of 0.60 is more than the 0.05 level of significance the null hypothesis is not

significant. This means that significant difference did not exist between the mean ratings of ITE Lecturers and Industry technical workers in their perceptions for the technical skills currently provided by ITE offerings in public Universities.

Discussion

The findings of the study in Table 1 revealed the technical skills required by industries in Nigeria. The results showed that lecturers of ITE and industry technical workers agreed that the nine technical skills identified are highly needed in Nigerian industries. These findings align with the opinion of Spacey (2018), who emphasized the importance of technical competencies in industrial development. Similarly, Adavbiele (2014) noted that industries in Nigeria require a range of technical skills, including construction and building technology skills, industrial technology skills, information and communication technology skills, engineering and manufacturing skills, cross-cutting technical competencies, problem-solving skills, workshop safety and compliance skills, project management, tools and equipment handling skills, and maintenance management skills.

However, the study further revealed in Table 2 that the technical skills currently provided by ITE in public universities do not adequately align with industry requirements. The findings indicated that both lecturers and industry technical workers agreed that the technical skills offered are at a low level relative to what industries demand. This demonstrates a clear mismatch between the skills required by industries and those provided by educational institutions. Supporting this, Adavbiele (2014) reiterated that industries require diverse technical competencies such as construction technology, Information and communication technology, engineering, manufacturing, problem-solving, safety compliance, and maintenance management skills, which are insufficiently delivered in current academic programs. This finding is consistent with Ayonmike (2016), who observed that ITE programmes often struggle to keep pace with the rapidly evolving demands of modern industries. Furthermore, Okeke (2016) reported that graduates frequently lack essential employable skills, including construction technology, Information and communication technology, engineering and manufacturing skills, problem-solving abilities, safety compliance, and maintenance management competencies.

In addition, the study in Table 3 revealed the causes of the gap between industry needs and the technical skills provided by ITE programmes in public Universities. The findings showed that lecturers and industry technical workers agreed on several key factors contributing to this gap. These include weak collaboration between industries and educational institutions, poor funding, inadequate training facilities, lack of modern equipment, outdated curricula, insufficient practical exposure for students, limited industrial experience among lecturers, and inadequate duration of industrial attachment programs. These results are consistent with Oluwakemi (2017), who highlighted poor industry–institution collaboration as a major factor, and Goyol (2017), who attributed the gap to insufficient funding and inadequate training infrastructure.

Furthermore, the study in Table 4 revealed the practical strategies to bridge the technical skills gap between industry requirements and ITE offerings in public Universities. Respondents agreed on several effective measures, including strengthening partnerships between industries and educational institutions, involving industry professionals in curriculum development, increasing time allocated to practical training, exposing lecturers to industrial experience, integrating emerging technologies into training, improving funding, and upgrading educational infrastructure. These findings support Okeke (2016), who emphasized the importance of

collaboration and shared training facilities to enhance employability, and Nwoye (2020), who advocated for continuous industry consultation and effective communication as key strategies for closing the skills gap.

Finally, the results of the two null hypotheses indicated that no significant difference existed between the mean ratings of ITE lecturers and industry technical workers regarding their perceptions of the technical skills required by industries in Nigeria and the technical skills currently provided by ITE programmes in public universities. This finding suggests a shared understanding between both groups about the gap between industry needs and university training.

Conclusion

This study examined the research topic, "Bridging the technical skills gap between Industry needs and ITE Offerings in public Universities in Nigeria." Based on the findings, it was concluded that all nine identified technical skills are highly demanded by industries in Nigeria, as confirmed by ITE lecturers, as well as industry technical workers. Furthermore, the results of the t-test for the null hypothesis indicate that there is no significant difference between the opinions of ITE lecturers and industry technical workers regarding the technical skills needed and those provided by public universities. This finding underscores the alignment between industry requirements and educational offerings, highlighting the potential for public universities to effectively address the technical skills gap in Nigeria's industrial sector.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. All the identified technical skills are in high demand in Nigerian industries, therefore these skills should be incorporated into the ITE curriculum.
2. Industrial professionals should be actively involved in reviewing and updating the ITE curriculum.
3. ITE department and industries should establish strong partnerships to help close the skills gap.
4. More time should be allocated to practical sessions in ITE programmes to enhance hands-on experience.
5. Government should provide adequate funding and modern infrastructural facilities for ITE in public universities across Nigeria.

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