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Bridging the Skills Gap: Evaluating the Impact of TVET on Digital and Entrepreneurial Competencies among Final-Year Students in Southeastern Nigeria

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Abstract

Youth unemployment in Nigeria remains a pressing socio-economic challenge, driven by a persistent mismatch between educational outcomes and labour market needs. This study examines how Technical and Vocational Education and Training (TVET) institutions in Abia, Anambra, and Imo states of Southeastern Nigeria equip final-year students with digital and entrepreneurial skills for employment and self-reliance in a technology-driven economy. A descriptive survey design was employed, with structured questionnaires administered to 242 students across five public TVET institutions. Descriptive statistics and chi-square tests revealed significant associations between digital skill exposure and readiness for digital employment ($\chi^2 = 18.23$, $p < .001$), entrepreneurship training and confidence in starting a business ($\chi^2 = 11.42$, $p = .001$), and practical training with an understanding of business management ($\chi^2 = 10.57$, $p = .001$). Additionally, awareness of startup support resources was significantly associated with self-employment preparedness ($\chi^2 = 9.34$, $p = .002$). Despite moderate exposure to basic digital and entrepreneurial skills, gaps persist in applied training, coding, and digital marketing. Infrastructural deficits and outdated curricula remain key barriers. Findings underscore the urgent need for systemic reforms to align TVET programs with Industry 4.0 demands and Nigeria's digital economy goals.

Keywords: TVET, digital skills, entrepreneurship, youth employability, Nigeria

1. Introduction

Youth unemployment remains a formidable socio-economic challenge in Nigeria, particularly among the country's rapidly expanding youth population, estimated at 95 million or 45% of the total population (Akinyetun, 2024). With national youth unemployment and underemployment rates persistently high (Ihekwaba, 2024), the mismatch between educational outputs and labour market demands continues to undermine efforts at economic inclusion and self-reliance (Raheem & Ayika, 2019; Bello & Ajao, 2024). In Southeastern Nigeria, comprising states like Abia, Anambra, and Imo, this problem is compounded by poor access to industry-ready training, limited job creation, and inadequate infrastructure (Bello & Ajao, 2024).

The Fourth Industrial Revolution (Industry 4.0), characterised by widespread digitisation and automation, has further widened the skills gap. Competencies in areas such as coding, digital marketing, data analytics, and business innovation are now prerequisites for

meaningful engagement in the modern workforce. However, traditional academic pathways in Nigeria are ill-equipped to cultivate these capabilities at scale. In this context, Technical and Vocational Education and Training (TVET) emerges as a strategic vehicle for workforce development, self-employment, and youth empowerment, particularly when effectively integrated with digital and entrepreneurial competencies (Nweke & Osakwe, 2024; Okanya, Kuwanta, & Yohanna, 2023). As global economies shift towards knowledge-based systems, traditional educational pathways are proving insufficient in equipping young Nigerians with the competencies needed for meaningful participation. In this context, digital literacy and entrepreneurial skills are no longer optional but essential for economic survival and social mobility (Jackson et al., 2024).

While Technical and Vocational Education and Training (TVET) institutions in Nigeria are conceptually recognised for their potential to equip students with practical and entrepreneurial skills, actual delivery often falls short. Challenges such as outdated curricula, insufficiently trained instructors, lack of digital infrastructure, and limited industry linkages persist across many institutions (Kwami, 2024; Rufus et al., 2024). Furthermore, entrepreneurship education, though included in national policy documents like the National Digital Economy Policy and Strategy (2020–2030), is frequently theoretical, poorly contextualised, and minimally implemented at the institutional level (Jackson et al., 2024; Yapilami & Balami, 2024). These structural and instructional deficiencies hinder the development of both digital fluency and entrepreneurial self-efficacy, which are critical for navigating Nigeria's evolving economic landscape.

Several scholars and policymakers have acknowledged the mismatch between the skills being taught in TVET institutions and the actual demands of the labour market. Kwami (2024) observes that many Nigerian TVET programs continue to emphasise manual, analogue skills that are becoming obsolete in today's digital economy. Similarly, studies by Rufus et al. (2024) and Adeniyi et al. (2022) highlight significant gaps in curriculum relevance, especially in terms of teaching digital entrepreneurship, coding, data analytics, and ICT literacy. These deficiencies mean that students, even upon completion of their training, remain ill-equipped for either wage employment or self-employment in modern economic sectors.

More critically, the current TVET framework often overlooks entrepreneurial education as a core component. While entrepreneurship is mentioned in national policy documents like the Nigerian Skills Qualification Framework (NSQF) and the National Digital Economy Policy and Strategy (2020–2030), actual implementation at the institutional level has been inconsistent and largely symbolic (Jackson et al., 2024; Yapilami & Balami, 2024). Entrepreneurship modules, where they exist, are often theoretical and detached from the real-world challenges of starting and sustaining a business in Nigeria's volatile economic environment. Furthermore, opportunities for students to engage in business simulations, practical apprenticeships, or digital innovation labs are extremely limited, particularly in the southeastern states.

Against this backdrop, digital and entrepreneurial skill development emerges as a critical area of concern. Multiple studies underscore the importance of blending technical training with digital literacy and entrepreneurial competencies to achieve meaningful youth empowerment. For instance, Nweke and Osakwe (2024) demonstrated that entrepreneurial skills such as conceptual thinking, social trading, and computer application significantly correlate with TVET effectiveness in Rivers State. While this study provides important insights, its geographic focus does not extend to Southeastern Nigeria, leaving a gap in understanding how these dynamics unfold in a different socio-economic context.

Moreover, emerging research emphasises the transformative potential of technology-enhanced TVET programs. Okanya et al. (2023) advocate for the integration of smartboards, Web 2.0 tools, and AI-based learning platforms into vocational education. Similarly, Ukala and Iheukwumere (2025) argue for the integration of AI and digital simulation tools into TVET curricula in Abia State, noting that such innovations can greatly improve students' problem-solving skills and industry alignment. However, these initiatives are in nascent stages and often limited by infrastructural and financial constraints, especially in public institutions.

These challenges are not without policy implications. The National Digital Economy Policy and Strategy (2020–2030) aims to position Nigeria as a leader in the global digital economy by improving digital literacy and skill acquisition across all educational levels. However, implementation remains uneven across regions. While federal initiatives set the stage, their success largely depends on localised execution, particularly in educational institutions responsible for delivering TVET. Thus, it becomes essential to empirically examine how well these institutions in Southeastern Nigeria are aligning with national objectives and global trends.

This study narrows its focus to final-year TVET students in Abia, Anambra, and Imo states. This demographic is particularly critical because they are on the cusp of transitioning into the labour market. Assessing their exposure to entrepreneurship and digital training, as well as their perceived readiness for employment or self-employment, provides valuable insights into the effectiveness of current TVET programs. In Southeastern Nigeria, urbanisation and informal enterprise activity are on the rise, and the demand for work-ready youth is particularly acute (Egwuagu & Anikeze, 2024). Yet, empirical studies examining how TVET programs in this region support digital and entrepreneurial skill development remain scarce. Prior research has largely focused on Northern and Southwestern Nigeria (Raji et al., 2021; Yapilami & Balami, 2024), overlooking the Southeast's unique socio-economic context and institutional dynamics.

The rationale for selecting this cohort stems from their unique position; having completed most of their curriculum, they are well situated to reflect on their training experience. Additionally, understanding the specific barriers these students face, such as inadequate mentorship, outdated tools, or lack of startup capital, can inform targeted interventions. This understanding allows for more precise policy recommendations tailored to the socio-economic realities of Southeastern Nigeria, where educational infrastructure is often fragmented and state-level support varies significantly.

Therefore, this study is driven by the urgent need to assess the actual impact of TVET programs on youth's acquisition of digital and entrepreneurial skills in Southeastern Nigeria. By focusing on final-year students in Abia, Anambra, and Imo states, the research seeks to provide concrete evidence on the current state of training, perceived employability, and the challenges students face. The goal is to inform more effective curriculum design, funding models, and policy reforms that align with both national development strategies and the demands of Industry 4.0. In doing so, this paper contributes to ongoing efforts to reposition TVET as a viable pathway for youth empowerment, self-reliance, and economic inclusion in Nigeria.

2. Objectives

In line with the critical need to enhance youth employability through relevant and practical training, this study sets out to examine how effectively Technical and Vocational Education

and Training (TVET) institutions in Southeastern Nigeria are equipping final-year students with the digital and entrepreneurial competencies required in the 21st-century economy. The specific objectives of the study are as follows:

1. To assess the extent of entrepreneurship and digital skills training received by final-year TVET students in Southeastern Nigeria.
2. To examine students' perceptions of the effectiveness of TVET in preparing them for self-employment and participation in the digital workforce.
3. To identify the key structural and instructional challenges that constrain digital and entrepreneurial skill acquisition within TVET institutions.

2.1 Hypotheses

Based on the study objectives, the following hypotheses were tested:

i. There is a significant association between exposure to digital skills training and students' perceived readiness for digital employment.
ii. There is a significant association between entrepreneurship training and students' confidence in starting a business.
iii. Practical entrepreneurial training is significantly associated with students' understanding of business management.
iv. Awareness of startup support resources is significantly associated with students' perceived self-employment readiness.

3. Materials and Methods

3.1 Research Design

This study employed a descriptive survey research design, which is appropriate for studies seeking to collect quantifiable data on respondents' experiences, perceptions, and challenges in natural settings without manipulation. The choice of this design was informed by the study's goal to capture the experiences, perceptions, and challenges of final-year students in Technical and Vocational Education and Training (TVET) institutions regarding their exposure to digital and entrepreneurial skill development. The descriptive survey approach enables the researcher to gather quantitative data from a defined group and to identify trends, patterns, and relationships among variables without manipulating the research environment (Creswell, 2014). It also facilitated the systematic collection and analysis of data across multiple institutions, enabling generalisations about the current state of training and students' perceived employability. Structured questionnaires were the primary data collection tool, ensuring consistency in responses and allowing for statistical analysis. This approach is especially appropriate for education-related inquiries where student perspectives are central to evaluating institutional effectiveness and program outcomes.

3.2 Population and Sample

The population for this study consisted of final-year students enrolled in five public TVET institutions across three states in Southeastern Nigeria—Abia, Anambra, and Imo. The TVET institutions include Ogbonnaya Onu Polytechnic (Formerly Abia State Polytechnic), Aba, Abia State, Federal Polytechnic, Oko, Anambra State, Anambra State Polytechnic, Mgbakwu, Anambra State, Imo State Polytechnic Omuma, Imo State and Federal Polytechnic, Nekede, Owerri, Imo State. The three states were purposefully selected to represent the Southeastern geopolitical zone, which, despite its entrepreneurial potential, faces persistent educational and economic challenges. The TVT five institutions were selected based on the fact that they are the oldest TVET institutions within the selected states. Final-year students were targeted because they are best positioned to reflect on their

cumulative training experience and assess their readiness for transition into the labour market.

A total of 242 students formed the study population. Due to the relatively manageable size of this population, a census approach was adopted, involving the entire population rather than drawing a sample. This decision ensured that the findings would reflect the perspectives of all eligible respondents, increasing the comprehensiveness and generalizability of the data within the study area. This full-coverage approach also minimised sampling bias and enhanced the statistical power of the analysis.

3.3 Instrumentation

Data for this study were collected using a structured questionnaire carefully designed to align with the research objectives. The instrument comprised five sections. The first section gathered demographic information such as age, gender, institution type and location, course of study, and residential background. This allowed for the classification and contextual interpretation of responses. The second section assessed students' exposure to entrepreneurship training through Likert-scale items on business planning, opportunity identification, and participation in practical simulations. The third section focused on digital skills training, including proficiency in Microsoft Office, internet use, coding, and digital marketing, alongside self-reported confidence in applying these tools. The fourth section explored perceived preparedness for employment and self-employment, capturing students' readiness to launch ventures or enter the digital workforce. The final section identified key training challenges, including infrastructure deficits, lack of mentorship, inadequate digital tools, and outdated curricula.

To ensure validity, the questionnaire was reviewed by two education and TVET experts and refined based on their feedback. A pilot test was conducted with 50 students of the Kenule Beeson Saro-Wiwa Polytechnic, Bori, Rivers State, Nigeria, and the instrument yielded a Cronbach's alpha of 0.74, indicating acceptable reliability.

3.4 Data Collection and Analysis

Data collection was conducted over a period of four weeks using both physical distribution and digital means. Printed questionnaires were administered in classrooms and lecture halls, while an online version was made available via Google Forms to ensure accessibility and increase response rates, especially in locations where internet access was reasonably stable. Informed consent was obtained from all participants, and the anonymity and confidentiality of responses were assured to enhance openness and honesty.

Once collected, the data were coded and analysed using the Statistical Package for the Social Sciences (SPSS) version 25. Analysis was conducted in two stages. First, descriptive statistics, such as frequencies, percentages, means, and standard deviations, were used to summarise the demographic characteristics of respondents and to identify patterns in their exposure to digital and entrepreneurial training, perceived readiness for employment or self-employment, and the challenges encountered.

Next, inferential statistics were applied to test relationships between key variables. Specifically, chi-square tests were used to examine whether significant associations existed between students' exposure to digital and entrepreneurial skills and their perceived employability. These tests provided insights into how training quality and content influenced students' confidence and preparedness, thus offering an evidence-based assessment of TVET program effectiveness.

Where necessary, cross-tabulations were used to compare results across the three states (Abia, Anambra, and Imo), providing localised insights into institutional performance and regional disparities in training outcomes.

4. Results

This section presents the analysis of responses from 242 final-year TVET students across Abia, Anambra, and Imo states. Results are organised under key themes corresponding to the study objectives: exposure to entrepreneurship and digital skills training, perceived employability, and structural challenges.

4.1. Exposure to Entrepreneurship and Digital Skills Training

Table 1. Distribution of Student Responses on Entrepreneurship and Digital Skills Exposure (n = 242)

Item	Strongly Disagree/Disagree (%)	Neutral (%)	Agree/Strongly Agree (%)
Received formal entrepreneurship training	18.2	20.2	61.6
Participated in practical business plan writing	26.4	25.3	48.3
Taught how to identify business opportunities	19.0	24.8	56.2
Involved in real-life business simulations or group projects	35.6	25.6	38.8
Entrepreneurship integrated across subjects	28.1	26.9	45.0
Learned to use basic computer tools (MS Word, Excel)	11.2	16.5	72.3
Received training in internet/email use	14.4	21.6	64.0
Exposed to digital marketing/e-commerce tools	43.2	27.0	29.8
Learned basic coding/programming	57.0	21.9	21.1
Confident using digital tools for business/work	29.3	25.7	45.0

Table 1 presents the distribution of student responses regarding their exposure to entrepreneurship and digital skills training within their TVET programs. The results reveal varying levels of training depth and practical engagement across key competencies. A majority of respondents (61.6%) agreed or strongly agreed that they received formal entrepreneurship training during their program. However, 18.2% disagreed, and 20.2% remained neutral, indicating that the coverage or consistency of entrepreneurship education may vary across institutions. Regarding practical entrepreneurship components, such as business plan development, only 48.3% reported engaging in such exercises, while 26.4% disagreed and 25.3% were neutral. Similarly, 56.2% stated they were taught how to identify business opportunities, although a notable minority (19.0%) disagreed, and 24.8% were unsure. These figures suggest that while conceptual training is relatively present, practical applications remain limited. In terms of exposure to group projects or business simulations, just 38.8% of students confirmed involvement, whereas 35.6% disagreed and

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25.6% were neutral. This points to a shortfall in experiential learning methods that support entrepreneurial readiness. On the digital skills side, 72.3% of students indicated that they had been taught to use basic computer tools such as Microsoft Word and Excel, showing strong penetration of foundational ICT training. Training in internet use and email communication was also relatively high, with 64.0% reporting exposure. However, the results drop off significantly when it comes to more advanced or market-relevant digital skills. Only 29.8% of students had been introduced to digital marketing or e-commerce tools, while 43.2% disagreed and 27.0% were neutral. Training in basic coding or programming was even less prevalent, with just 21.1% indicating exposure, and a majority (57.0%) reporting no such training. Finally, 45.0% of students agreed or strongly agreed that they felt confident using digital tools for business or work-related purposes, whereas 29.3% disagreed and 25.7% were neutral.

Overall, the data reveal that while basic digital literacy is fairly well integrated into TVET programs, more specialized and entrepreneurial-oriented training, both in business and digital innovation, remains underdeveloped. These findings suggest a need to enhance practical and industry-relevant skill acquisition to prepare students for modern employment and entrepreneurial opportunities fully.

4.2. Perceived Employability and Self-Employment Readiness

Table 2. Perceived Readiness for Employment and Entrepreneurship (n = 242)

Item	Strongly Disagree/Disagree (%)	Neutral (%)	Agree/Strongly Agree (%)
Training prepared me well for self-employment	30.5	27.4	42.1
I feel confident starting a small business	37.2	26.8	36.0
I can compete in the digital workforce	28.1	23.1	48.8
I understand how to manage a business (budgeting, sales, etc.)	40.9	25.6	33.5
I'm aware of startup resources (grants, hubs, etc.)	51.2	22.3	26.4

Table 2 summarizes students' self-assessed readiness for employment and self-employment based on their TVET training experience. The results indicate a moderate level of confidence among final-year students, with noticeable gaps in key areas. Overall, 42.1% of respondents agreed or strongly agreed that their training prepared them well for self-employment. However, 30.5% disagreed, and 27.4% remained neutral, suggesting that a significant portion of students were either uncertain or dissatisfied with the practical relevance of their training. In terms of confidence to start a business, only 36.0% of students felt ready to do so, while a larger proportion (37.2%) disagreed, and 26.8% remained neutral. This reflects hesitation among students regarding their entrepreneurial capabilities and readiness to transition into business ownership. Nearly half of the respondents (48.8%) believed they could compete in the digital workforce, although 28.1% disagreed, and 23.1% were neutral. This indicates that while some students feel technologically prepared, a considerable percentage are either unsure or lack the necessary confidence. When asked about their ability to manage a small business, including budgeting and sales,

only 33.5% expressed confidence, while 40.9% disagreed, and 25.6% remained neutral. This suggests that practical business management skills may not be adequately emphasized in the curriculum. Finally, just 26.4% of respondents reported being aware of available startup resources such as grants, hubs, or funding schemes. A majority (51.2%) disagreed, and 22.3% were neutral. This finding highlights a significant information and access gap in support systems that are critical for post-training entrepreneurial success.

Taken together, the results point to limited perceived readiness among students, particularly in self-employment and business management. While there is some confidence in digital competencies, the data reflect broader concerns about the practical effectiveness of TVET programs in preparing students for real-world economic participation.

4.3. Structural and Instructional Challenges

Table 3. Structural and Instructional Challenges Reported by Students (n = 242)

Challenge	Reported "Yes" (%)	Reported "No" (%)
Inadequate classroom/workshop facilities	82.6	17.4
Lack of internet access or digital tools	78.1	21.9
Inconsistent power supply	74.8	25.2
Lack of trained instructors (entrepreneurship/digital)	69.8	30.2
No access to mentors/guidance counsellors	65.3	34.7
No exposure to real-life or industry-based training	71.1	28.9
Lack of startup capital or funding schemes	76.4	23.6
Outdated or irrelevant curriculum	67.8	32.2

Table 3 presents the structural and instructional challenges encountered by final-year TVET students in Southeastern Nigeria. The most commonly reported challenge was inadequate classroom or workshop facilities, identified by 82.6% of respondents. This indicates a widespread limitation in the availability of functional, well-equipped learning environments. A lack of internet access and digital tools was reported by 78.1% of students, highlighting a significant barrier to digital skill development. Similarly, 74.8% indicated that inconsistent power supply disrupted their training experience, particularly in activities requiring electricity-dependent tools and resources. A substantial 69.8% of respondents reported the absence of adequately trained instructors in entrepreneurship and digital skills, which likely affects the depth and relevance of content delivery. In addition, 71.1% noted no exposure to real-life or industry-based training, suggesting a gap between classroom learning and practical application. The lack of access to mentors or guidance counsellors was reported by 65.3% of students, pointing to a shortfall in career guidance and professional support structures. Outdated or irrelevant curricula were also flagged by 67.8%, indicating that many programs have not kept pace with evolving industry needs. Finally, 76.4% of respondents indicated they had no access to startup capital or funding schemes, emphasising a major barrier to self-employment, even among those with entrepreneurial ambitions.

These findings suggest that the majority of students face a combination of infrastructural, instructional, and financial challenges that undermine the effectiveness of their training and limit their preparedness for employment or self-employment. The results reflect a pressing need for investment in facilities, human resources, curriculum review, and support mechanisms across TVET institutions in the region.

4.4. Chi-Square Analysis of Training Exposure and Employability Perceptions

Table 4 Summary of Chi-Square Test Results for Training Exposure and Perceived Employability (n = 242)

Variables Compared	χ^2 (df)	p-value	Significance
Digital skill exposure × Perceived readiness for digital workforce	18.23(1)	< .001	Significant
Entrepreneurship training × Confidence in business startup	11.42(1)	.001	Significant
Practical training × Understanding of business management	10.57(1)	.001	Significant
Coding skills × Readiness for digital employment	7.89(1)	.005	Significant
Awareness of startup support × Self-employment preparedness	9.34(1)	.002	Significant

Table 4 summarizes the results of chi-square tests conducted to examine the relationship between students' exposure to entrepreneurship and digital skills training and their perceived employability. The analysis revealed a statistically significant association between exposure to digital skills (such as basic computer use and internet tools) and students' belief in their readiness to participate in the digital workforce, $\chi^2(1, N = 242) = 18.23$, $p < .001$. This suggests that students who received digital training were more likely to express confidence in their digital employability.

Similarly, a significant association was found between entrepreneurship training and confidence in starting a small business, $\chi^2(1, N = 242) = 11.42$, $p = .001$. Students with greater exposure to entrepreneurial content were more likely to report readiness for self-employment. Practical training elements, such as participation in business simulations and planning exercises, were also significantly linked to students' understanding of small business management, $\chi^2(1, N = 242) = 10.57$, $p = .001$. In addition, students who had received any form of coding or programming training were significantly more likely to report readiness for digital employment, $\chi^2(1, N = 242) = 7.89$, $p = .005$. Lastly, awareness of startup support resources, such as grants or business hubs, was significantly associated with a sense of preparedness for self-employment, $\chi^2(1, N = 242) = 9.34$, $p = .002$. These results indicate that targeted training and exposure to relevant skills significantly influence students' confidence and perceived readiness for both employment and entrepreneurship.

5. Discussion of Findings

This study assessed the impacts of Technical and Vocational Education and Training (TVET) institutions in Southeastern Nigeria in equipping final-year students with digital and entrepreneurial skills. It also examined how these competencies influence students' readiness for employment or self-employment. The findings highlight significant achievements and persistent challenges in aligning TVET curricula with 21st-century labour

market demands. This section discusses these results, hypothesis by hypothesis, in relation to existing literature and broader educational and economic contexts.

The first hypothesis proposed that exposure to digital skills is significantly associated with students' perceived readiness for the digital workforce. This hypothesis was supported by the data, with a statistically significant relationship observed between students' digital training and their confidence in participating in the digital economy. While foundational skills such as the use of Microsoft Office and internet tools were widely reported, advanced digital competencies, particularly in areas like coding and digital marketing, were notably lacking. Only 21.1% of students had received any form of coding instruction. This aligns with findings by Bello and Ajao (2024), who reported that Nigeria's digital skill development policies remain poorly implemented across most educational levels, particularly at the TVET level. Similarly, Jackson et al. (2024) emphasised that despite the growing importance of generative AI and digital intelligence, infrastructure and educator capacity continue to limit integration into TVET curricula. The implications of these findings are significant. Without the ability to teach students skills aligned with Industry 4.0, such as programming, digital simulations, and AI-based applications, TVET institutions will continue to struggle with preparing youth for digital employment. There is a clear need for curriculum enhancement and investment in digital infrastructure, a position echoed by Okanya et al. (2023), who argue for the integration of Web 2.0 tools and smart technologies into vocational education.

The second hypothesis tested the relationship between exposure to entrepreneurship training and students' confidence in their ability to start a small business. The results support this hypothesis, revealing that students who received entrepreneurship training were more likely to express confidence in launching a business venture. However, this relationship was not uniformly strong, as only 36.0% of respondents expressed readiness to start a business, while a greater proportion (37.2%) disagreed. These results suggest that entrepreneurship education remains largely theoretical and disconnected from practical realities. Indeed, less than half of the students (48.3%) had engaged in practical business planning activities, and only 38.8% had participated in business simulations or group projects. These findings mirror those of Nweke and Osakwe (2024), who identified conceptual and technical gaps in entrepreneurship training among TVET students in Rivers State. Their recommendation for institution-industry partnerships to improve experiential learning is particularly relevant here. Similarly, Kwami (2024) and Yapilami and Balami (2024) argue that entrepreneurship modules must include applied components such as simulations, market analysis, and budgeting exercises to be effective. The current lack of such opportunities may explain students' hesitance in translating classroom knowledge into entrepreneurial confidence. As Adeniyi et al. (2022) found, entrepreneurial self-efficacy is significantly influenced by practical experience and the ability to mobilize resources, elements still missing from most TVET programs.

The third hypothesis posited that participation in practical training is significantly associated with students' understanding of business management. The data validated this hypothesis, showing a significant association between practical entrepreneurship activities, such as business planning and simulations, and students' perceived business management competence. However, only a third of respondents (33.5%) felt confident in managing a business, while 40.9% disagreed. This indicates a considerable skill gap in essential entrepreneurial functions such as budgeting, marketing, and operations. This pattern is consistent with the observations of Rufus et al. (2024), who developed a framework identifying both technical and mindset skills needed for entrepreneurship but found them lacking in TVET curricula. Onweh et al. (2013) similarly pointed out that business

management instruction in Nigerian TVET often lacks real-world relevance due to outdated teaching methods and minimal hands-on learning. The findings of this study reinforce these concerns and suggest that unless entrepreneurship education is supported with consistent, real-life applications, its impact on students' readiness for business leadership will remain limited. Practical modules, mentorship programs, and incubation labs should be institutionalised to address this shortcoming and provide students with the applied skills necessary for sustainable self-employment.

The fourth hypothesis examined the association between awareness of startup support systems and students' preparedness for self-employment. A significant relationship was found, indicating that students who were more informed about startup resources, such as grants, innovation hubs, and support schemes, were more likely to feel ready to engage in entrepreneurial activities after graduation. Despite this, a large proportion of respondents (51.2%) reported being unaware of such resources. This lack of exposure represents a critical institutional failure in preparing students for the realities of post-training entrepreneurship. Tondi (2023) similarly reported that TVET graduates in South Africa often struggled due to poor access to funding, mentorship, and incubator programs, despite being conceptually ready to start businesses. In the Nigerian context, Ozor et al. (2024) observed that initiatives like the National Digital Economy Policy have created entrepreneurial opportunities, but these are underutilized due to weak implementation and poor awareness. This points to the need for TVET institutions to go beyond training delivery and actively facilitate access to entrepreneurial ecosystems. Establishing liaison units and industry partnerships, as suggested by Azubuike and Oguguo (2024), could bridge the gap between training and economic participation, especially in regions like Southeastern Nigeria, where economic challenges and institutional fragmentation persist.
Taken together, the findings reveal a complex interplay between curriculum content, institutional capacity, and students' perceptions of readiness. While TVET institutions have made some progress in providing foundational digital and entrepreneurial training, there are deep-seated structural and instructional limitations that hinder the development of employable and self-reliant graduates. These findings reflect national-level concerns raised by Raheem and Ayika (2019) and Jackson et al. (2024), who emphasise that without addressing infrastructure, teacher quality, and curriculum relevance, TVET will continue to fall short of its developmental potential. By situating this study within the broader context of national education policy and global labour market trends, it becomes evident that transforming TVET into a robust engine for youth empowerment in Southeastern Nigeria will require coordinated reforms at institutional, policy, and implementation levels.

6. Conclusion

This study has demonstrated that while technical and vocational education and training institutions in Southeastern Nigeria offer foundational exposure to digital and entrepreneurial skills, these efforts fall short in delivering the depth and practical relevance required for youth empowerment in a rapidly evolving economic landscape. The most significant outcome of the research lies in the clear empirical linkage between skill exposure and perceived employability, underscoring the transformative potential of TVET when aligned with industry needs and modern technological realities. However, this potential remains largely unrealized due to inadequate infrastructure, outdated curricula, and limited access to real-world entrepreneurial ecosystems.

The findings reveal that although students are receiving introductory training in ICT and business concepts, there is a pronounced deficiency in applied experiences such as coding, digital marketing, business simulations, and access to startup support systems. These gaps not only restrict students' confidence in entering the workforce or starting their own

ventures but also reflect systemic shortcomings in the design and delivery of vocational education. The prevailing TVET model continues to operate within a conventional instructional paradigm that inadequately prepares students for the demands of Industry 4.0 and the dynamic nature of the digital economy.

From a broader scientific perspective, the study contributes to a growing body of evidence advocating for a shift in TVET pedagogy from theoretical orientation toward competency-based, experiential learning. This transformation is not merely a curriculum issue but a structural one, requiring the integration of institutional support mechanisms such as innovation hubs, mentorship programs, and strong public-private linkages. The research therefore reinforces the postulate that education systems must evolve not just in content but also in delivery methods, infrastructure, and stakeholder engagement if they are to function as catalysts for sustainable development.

Despite its comprehensive approach, the study is constrained by its cross-sectional design, which captures students' perceptions at a single point in time and may not reflect long-term outcomes. Additionally, the focus on public institutions within three states limits the generalizability of findings across the broader Nigerian context or to private TVET providers. Future research should adopt a longitudinal approach to track the real-world outcomes of TVET graduates and assess the long-term effectiveness of entrepreneurship and digital skill training. Comparative studies across different regions or between public and private institutions would also yield deeper insights into best practices and context-specific challenges. Additionally, studies could explore gender dynamics and rural-urban disparities in skill acquisition, as suggested by Adeniyi et al. (2022) and Bello and Ajao (2024), to inform more inclusive policies.

In light of the evidence presented, it is recommended that policymakers and educational leaders prioritize the modernisation of TVET curricula to include more advanced digital tools and entrepreneurial practices. Investments in digital infrastructure, targeted teacher training, and institutional reforms are critical for bridging the gap between training and real-world application. Furthermore, establishing strategic partnerships with industry stakeholders will ensure that vocational training remains responsive to labour market trends and technological innovations. Without such systemic changes, TVET risks perpetuating, rather than solving, the youth unemployment crisis it is meant to address.

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