

ARTIFICIAL INTELLIGENCE AND DIGITAL TECHNOLOGY COMPETENCIES AS PREDICTORS OF TECHNO-ENTREPRENEURSHIP COMPETENCIES AMONG VOCATIONAL EDUCATION STUDENTS IN COLLEGES OF EDUCATION IN SOUTH-EAST NIGERIA

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Abstract

The increasing integration of artificial intelligence (AI) and digital technologies into education has created new opportunities for developing vocational students' competencies for technology-supported entrepreneurship. This study examined the predictive influence of artificial intelligence competency and digital technology competency on techno-entrepreneurship competency among vocational education students in Colleges of Education in South-East Nigeria. A correlational survey design was adopted. The population comprised 585 vocational education students from selected Colleges of Education in Abia, Anambra, Ebonyi, Enugu and Imo States. A sample of 210 students was selected using proportionate stratified sampling. Data were collected using the Artificial Intelligence, Digital Technologies and Techno-Entrepreneurship Competencies Questionnaire (AIDTECQ), a 10-item instrument structured on a four-point scale. The instrument was pilot-tested, and Cronbach's alpha yielded an overall reliability coefficient of 0.82. Mean and standard deviation were used to answer Research Questions 1–3, while multiple regression was used to answer Research Questions 4–6 and test the hypotheses at the .05 significance level. Results showed that students demonstrated high levels of AI competency ($M = 2.65$, $SD = 0.53$), digital technology competency ($M = 3.04$, $SD = 0.49$), and techno-entrepreneurship competency ($M = 2.65$, $SD = 0.44$). However, AI competency did not significantly predict techno-entrepreneurship competency, $\beta = -.019$, $p = .781$, while digital technology competency also did not significantly predict it, $\beta = .001$, $p = .983$. Jointly, the predictors explained only 0.04% of the variance in techno-entrepreneurship competency, $F(2, 207) = .039$, $p = .961$. The study concludes that possession of AI and digital technology competencies alone may not automatically translate into techno-entrepreneurial competency.

Keywords: artificial intelligence competency, digital technology competency, techno-entrepreneurship, vocational education, Colleges of Education, South-East Nigeria

Introduction

The rapid development of artificial intelligence (AI), digital platforms and other emerging technologies is changing the knowledge, skills and competencies required for education, employment and entrepreneurship. Artificial intelligence is increasingly incorporated into learning, communication, information processing, decision-making and productive activities, making it necessary for students to develop competencies that enable them to use such technologies effectively and responsibly. UNESCO's AI Competency Framework for Students identifies competencies relating to human-centered thinking, AI ethics, AI techniques and applications, and AI system design, with progression from understanding to application and creation (Miao et al., 2024).

In vocational education, these developments are particularly important because vocational programmes are expected to equip learners with practical competencies that can support employment, self-employment and enterprise development. The World Bank (2019) identifies digital skills and digital entrepreneurship as important foundations of Nigeria's digital economy and observes that strengthening digital capabilities can create opportunities for economic participation and new business models. Thus, vocational education students require not only technical occupational skills but also the ability to use digital technologies and emerging AI applications to identify opportunities, solve problems, communicate with customers and develop technology-supported enterprises.

Artificial intelligence competency refers in this study to students' ability to use AI applications to generate ideas, analyze information, support decisions and engage with AI responsibly. This conceptualization is consistent with the UNESCO framework, which emphasizes the development of students as responsible users and co-creators of AI rather than passive consumers of AI-generated outputs (Miao et al., 2024). For vocational students, AI competency can therefore provide a foundation for innovation, opportunity identification and technology-supported decision-making.

Digital technology competency represents the ability to use digital tools and platforms effectively in academic, occupational and enterprise-related activities. It encompasses practical capabilities such as using productivity applications, communicating through digital platforms, promoting products and services online and accessing digital resources. The importance of such competencies is particularly relevant to Nigeria, where the World Bank has identified digital skills development as a key component of the country's digital transformation agenda. Recent Nigerian evidence also indicates that digital

technology competencies are considered important for the employability of business education students (Okoro & Okoro, 2025).

Techno-entrepreneurship competency combines entrepreneurial capabilities with the effective application of technology to identify opportunities, develop innovative products or services, solve business problems and manage technology-supported ventures. Entrepreneurial competency literature conceptualizes competencies as capabilities associated with entrepreneurial tasks and enterprise performance (Man et al., 2002). Similarly, Mitchelmore and Rowley (2010) describe entrepreneurial competencies as an important area of research because of their relationship with business development and success. In the context of vocational education, techno-entrepreneurship competency therefore goes beyond basic technology use to include the integration of vocational, digital and entrepreneurial capabilities in practical enterprise activities.

The relationship between technology competencies and entrepreneurial outcomes, however, should not be assumed to be automatic. A student may possess considerable competence in using digital tools but lack the opportunity-recognition, business-planning, creativity, confidence or practical enterprise experience needed to transform those skills into entrepreneurial action. Similarly, knowledge of AI applications may increase students' ability to access and process information without necessarily developing their capacity to establish or manage an enterprise. This distinction provides an important empirical question for vocational education research.

Recent evidence supports the potential relevance of AI to entrepreneurship. For example, Edokpolor et al. (2026) found that AI-driven technological application significantly predicted entrepreneurial career intentions among vocational business students in Nigerian universities. Their study reported a positive relationship between AI-driven technology and entrepreneurial career intentions, including a significant direct effect. However, entrepreneurial career intention differs conceptually from techno-entrepreneurship competency. Intention reflects an individual's inclination or plan to pursue an entrepreneurial career, whereas competency concerns the capabilities required to perform entrepreneurial tasks. Consequently, the findings of Edokpolor et al. provide an important basis for examining whether AI competency similarly predicts actual competency-oriented outcomes.

Against this background, the present study investigates whether AI competency and digital technology competency predict techno-entrepreneurship competency among vocational education students in Colleges of Education in South-East Nigeria. The study is important because evidence on whether

technological competencies translate into integrated techno-entrepreneurial competencies among Nigerian vocational education students remains limited.

Purpose of the Study

The purpose of the study was to examine artificial intelligence and digital technology competencies as predictors of techno-entrepreneurship competencies among vocational education students in Colleges of Education in South-East Nigeria. Specifically, the study sought to:

1. Determine the level of artificial intelligence competency among vocational education students;
2. Determine the level of digital technology competency among vocational education students;
3. Determine the level of techno-entrepreneurship competency among vocational education students;
4. Determine the extent to which artificial intelligence competency predicts techno-entrepreneurship competency;
5. Determine the extent to which digital technology competency predicts techno-entrepreneurship competency; and
6. Determine the joint predictive contribution of artificial intelligence competency and digital technology competency to techno-entrepreneurship competency.

Research Questions

The following research questions guided the study:

1. What is the level of artificial intelligence competency among vocational education students in Colleges of Education in South-East Nigeria?
2. What is the level of digital technology competency among vocational education students in Colleges of Education in South-East Nigeria?
3. What is the level of techno-entrepreneurship competency among vocational education students in Colleges of Education in South-East Nigeria?
4. To what extent does artificial intelligence competency predict techno-entrepreneurship competency?
5. To what extent does digital technology competency predict techno-entrepreneurship competency?

6. What is the joint predictive contribution of artificial intelligence competency and digital technology competency to techno-entrepreneurship competency?

Hypotheses

The following null hypotheses were tested at the .05 level of significance:

H01: Artificial intelligence competency does not significantly predict techno-entrepreneurship competency among vocational education students.

H02: Digital technology competency does not significantly predict techno-entrepreneurship competency among vocational education students.

H03: Artificial intelligence competency and digital technology competency do not jointly significantly predict techno-entrepreneurship competency among vocational education students.

Review of Related Literature

Artificial Intelligence Competency

Artificial intelligence competency refers to the knowledge, skills and dispositions required to understand, use, evaluate and interact responsibly with AI systems. AI competency is increasingly regarded as an essential component of contemporary education because learners encounter AI applications in information search, content generation, and communication, learning and decision-making. UNESCO's AI Competency Framework for Students identifies 12 competencies across four dimensions: human-centered mindset, ethics of AI, AI techniques and applications, and AI system design. The framework also proposes three levels of progression understand, apply and create indicating that AI competency involves progressively deeper forms of engagement with AI (Miao et al., 2024).

For vocational education students, AI competency can support activities such as generating business ideas, analyzing market information, developing promotional content and supporting enterprise-related decisions. However, responsible AI use requires more than technical familiarity. Students also need to consider accuracy, privacy, bias, accountability and ethical implications when applying AI. UNESCO's framework therefore emphasizes responsible and creative participation in AI-enabled environments rather than simple technological consumption (Miao et al., 2024).

Digital Technology Competency

Digital technology competency refers to the ability to effectively use digital devices, applications, platforms and communication technologies for learning, work and productive activities. Such competency may include the use of word-processing applications, spreadsheets, presentation software, online communication platforms, social media and other digital resources. In vocational education, digital competency provides students with tools for information management, communication, marketing and enterprise development.

The importance of digital technology competency is particularly evident within Nigeria's digital economy. The World Bank (2019) identifies digital skills as one of the foundational pillars required for Nigeria's digital transformation and notes that gaps in digital skills can restrict individuals' ability to benefit from digital opportunities. Similarly, Okoro and Okoro (2025) found that postgraduate business education students possessed varying levels of digital technology competencies relevant to employability, reinforcing the importance of digital skills within business-oriented education.

Digital technology competency can potentially contribute to entrepreneurship by enabling students to communicate with customers, advertise products, access markets, manage information and use online platforms. Nevertheless, possessing digital skills does not necessarily mean that an individual possesses the broader entrepreneurial competencies required to recognise opportunities, formulate business plans and sustain a venture. This distinction makes it necessary to empirically investigate the predictive contribution of digital competency to techno-entrepreneurship competency.

Techno-Entrepreneurship Competency

Techno-entrepreneurship competency refers to the integrated capacity to apply technological, vocational and entrepreneurial knowledge and skills to identify opportunities, develop innovative solutions and establish or manage technology-supported enterprises. It includes opportunity recognition, innovation, problem-solving, business planning, communication and the practical application of technology in enterprise activities.

The competency perspective of entrepreneurship emphasizes that entrepreneurial performance depends on a combination of competencies rather than on a single skill. Man et al. (2002) developed a conceptualization linking entrepreneurial competencies, organizational capabilities, competitive scope and enterprise performance. Mitchelmore and Rowley (2010) similarly reviewed entrepreneurial competency research and highlighted its importance for business growth and success. Thus, techno-

entrepreneurship competency can be viewed as a multidimensional construct requiring the integration of technological capability with entrepreneurial knowledge and practical skills.

For vocational education students, techno-entrepreneurship competency is especially relevant because vocational education is expected to support employability and enterprise creation. Students who can combine occupational skills with digital technologies may be better positioned to identify market opportunities, develop products and services and establish self-employment ventures. However, such outcomes depend on the extent to which technological competencies are integrated with entrepreneurial competencies.

Relationship between AI Competency, Digital Technology Competency and Techno-Entrepreneurship Competency

AI and digital technologies provide resources that can potentially support entrepreneurial activities. AI applications can assist with idea generation, information analysis and decision support, while digital technologies can support communication, marketing, networking and access to markets. These capabilities could theoretically strengthen students' ability to undertake technology-supported entrepreneurial activities.

Empirical evidence, however, provides a more nuanced picture. Edokpolor et al. (2026) reported a significant positive relationship between AI-driven technological application and entrepreneurial career intentions among vocational business students in Nigerian universities. Their study found that AI-driven technology significantly predicted entrepreneurial career intentions, although study engagement also played a mediating role. The present study differs in its outcome variable because it examines techno-entrepreneurship competency rather than entrepreneurial career intention.

Similarly, Okoro and Okoro (2025) demonstrated the importance of digital technology competencies for employability among postgraduate business education students. However, employability is broader than techno-entrepreneurship competency. Consequently, evidence that digital competency contributes to employability does not necessarily establish that it predicts students' ability to perform entrepreneurial tasks.

The present study therefore addresses an important empirical gap by examining whether AI and digital technology competencies independently and jointly predict techno-entrepreneurship competency among vocational education students in Colleges of Education in South-East Nigeria.

Theoretical Framework

Human Capital Theory

The study was anchored on Human Capital Theory developed by Becker (1964). The theory explains that education, training, knowledge and skills constitute forms of human capital that can improve individuals' productivity and economic outcomes. Becker's work specifically examines education and on-the-job training as investments that enhance productivity and earnings.

National Bureau of Economic Research

The theory is relevant to the present study because AI competency, digital technology competency and techno-entrepreneurship competency represent forms of knowledge and skills acquired through education and training. Vocational education provides students with opportunities to acquire occupational and entrepreneurial capabilities, while exposure to digital technologies and AI can expand the range of competencies available to them.

From the Human Capital Theory perspective, investment in AI and digital technology competencies should potentially increase students' productive capabilities. However, the empirical findings of the present study provide an important qualification: the possession of specific technological competencies does not necessarily result in higher techno-entrepreneurship competency. This suggests that additional forms of human capital, including entrepreneurial knowledge, practical experience, creativity and business management skills, may be required before technological competencies translate into entrepreneurial capabilities.

Conceptual Model

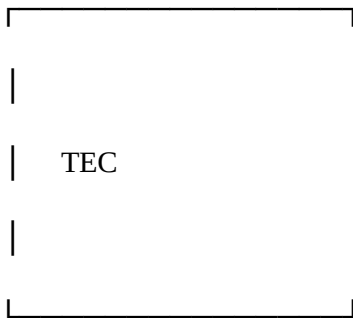
The conceptual model proposes that Artificial Intelligence Competency (AIC) and Digital Technology Competency (DTC) serve as predictor variables, while Techno-Entrepreneurship Competency (TEC) serves as the criterion variable.

Artificial Intelligence Competency

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Digital Technology Competency

The model assumes that AI competency and digital technology competency may independently and jointly contribute to students' techno-entrepreneurship competency. The empirical analysis tested these assumed predictive relationships.

Methodology

Research Design

The study adopted a correlational survey design because it examined the predictive relationships among artificial intelligence competency, digital technology competency and techno-entrepreneurship competency without manipulating the variables. The design was appropriate because the study sought to determine the extent to which existing levels of AI and digital technology competencies predicted techno-entrepreneurship competency.

Population of the Study

The population comprised 585 vocational education students in selected Colleges of Education across the five states of South-East Nigeria included in the study. The population consisted of 100 students from Abia State, 116 from Anambra State, 96 from Ebonyi State, 152 from Enugu State and 121 from Imo State.

Table 1: Population and Proportionate Sample Distribution of Vocational Education Students by State

State	Population (N)	Proportion (%)	Proportionate Sample (n)
Abia	100	17.1	36
Anambra	116	19.8	42
Ebonyi	96	16.4	34
Enugu	152	26.0	55
Imo	121	20.7	43
Total	585	100.0	210

Sample and Sampling Technique

A sample of 210 vocational education students was selected from the population of 585 students using a proportionate stratified sampling technique. The five states constituted the strata, while vocational education students within each state constituted the sampling units. The number of students selected from each state was determined proportionately using the formula:

$$n_b = N_b / N \times n$$

Where n_b represents the sample allocated to each state, N_b represents the population of the state, N represents the total population of 585 and n represents the total sample size of 210. Accordingly, 36 students were selected from Abia, 42 from Anambra, 34 from Ebonyi, 55 from Enugu and 43 from Imo State. This approach ensured that the contribution of each state's population to the overall sample was proportionately represented.

Instrument for Data Collection

Data were collected using the Artificial Intelligence, Digital Technologies and Techno-Entrepreneurship Competencies Questionnaire (AIDTECQ) developed for the study. The questionnaire consisted of 10 items covering three constructs: AI competency, digital technology competency and techno-entrepreneurship competency.

Items 1–3 measured AI competency, items 4–6 measured digital technology competency, while items 7–10 measured techno-entrepreneurship competency. Responses were structured on a four-point scale of Very High Extent (4), High Extent (3), Low Extent (2), and Very Low Extent (1).

Validity of the Instrument

The instrument was subjected to expert review to establish its content and face validity. Experts in vocational education, educational technology/artificial intelligence and educational measurement examined the items for relevance, clarity, adequacy and alignment with the constructs being measured. Their observations were used to refine the instrument before administration.

Reliability of the Instrument

The AIDTECQ was pilot-tested on vocational education students outside the study area who were not included in the main study. The internal consistency of the instrument was determined using Cronbach's alpha, which yielded an overall reliability coefficient of 0.82. Cronbach's alpha provides an index of the internal consistency of items within an instrument (Cronbach, 1951). The coefficient of 0.82 indicated satisfactory internal consistency and provided evidence that the instrument was sufficiently reliable for the main study.

Data Collection and Analysis

The instrument was administered to the sampled vocational education students, and the responses were coded and analysed quantitatively. Mean and standard deviation were used to answer Research Questions 1, 2 and 3. A criterion mean of 2.50 was adopted for interpreting the four-point scale. Mean scores of 2.50 and above were interpreted as high, whereas mean scores below 2.50 were interpreted as low.

Multiple regression analysis was used to answer Research Questions 4, 5 and 6 and to test the three null hypotheses at the .05 level of significance. The regression model was specified as:

$$TEC = \beta_0 + \beta_1 AIC + \beta_2 DTC + \varepsilon$$

where TEC represents techno-entrepreneurship competency, AIC represents artificial intelligence competency, DTC represents digital technology competency, represents the intercept, and represent the regression coefficients, and represents the error term.

Results

Research Questions 1, 2 and 3

Table 2

Mean and Standard Deviation of AI Competency, Digital Technology Competency and Techno-Entrepreneurship Competency among Vocational Education Students (Answers Research Questions 1, 2 and 3)

Variable	N	Mean	SD	Decision
AI Competency	210	2.65	0.53	High
Digital Technology Competency	210	3.04	0.49	High
Techno-Entrepreneurship Competency	210	2.65	0.44	High
Criterion Mean		2.50		

Table 2 shows that the respondents demonstrated a high level of AI competency, with a mean score of 2.65 and standard deviation of 0.53. Digital technology competency recorded the highest mean score of 3.04 with a standard deviation of 0.49, indicating a high level of digital technology competency. Techno-entrepreneurship competency also recorded a high mean score of 2.65 and standard deviation of 0.44. Thus, Research Questions 1, 2 and 3 were answered by the findings that the respondents demonstrated high levels of AI competency, digital technology competency and techno-entrepreneurship competency.

Research Questions 4, 5 and 6

Table 3: Multiple Regression Model Summary for AI Competency and Digital Technology Competency as Predictors of Techno-Entrepreneurship Competency (Answers Research Questions 4, 5 and 6)

R	R ²	Adjusted R ²	F	df	p
.019	.0004	-.009	.039	2, 207	.961

Table 3 shows that the multiple correlation coefficient was $R = .019$, while the coefficient of determination was $R^2 = .0004$. This indicates that AI competency and digital technology competency jointly explained approximately 0.04% of the variance in techno-entrepreneurship competency. The overall regression model was not statistically significant, $F(2, 207) = .039$, $p = .961$. Therefore, AI competency and digital technology competency did not jointly significantly predict techno-entrepreneurship competency.

Table 4: Regression Coefficients for AI Competency and Digital Technology Competency Predicting Techno-Entrepreneurship Competency (Answers Research Questions 4 and 5)

Predictor	B	SE B	β	t	p
Constant	2.688	.247	—	10.867	<.001
AI Competency	-.016	.057	-.019	-.279	.781
Digital Technology Competency	.001	.061	.001	.021	.983

Table 4 shows that AI competency had a negative but non-significant predictive coefficient, $\beta = -.019$, $t = -.279$, $p = .781$. Thus, AI competency did not significantly predict techno-entrepreneurship competency. Digital technology competency also had a very small positive but non-significant predictive coefficient, $\beta = .001$, $t = .021$, $p = .983$. Therefore, digital technology competency did not significantly predict techno-entrepreneurship competency.

The resulting regression equation was:

Test of Hypotheses

Hypothesis One

H01: Artificial intelligence competency does not significantly predict techno-entrepreneurship competency.

The result in Table 4 shows that AI competency did not significantly predict techno-entrepreneurship competency, $\beta = -.019$, $p = .781$, which is greater than .05. Therefore, the null hypothesis was not rejected.

Hypothesis Two

H02: Digital technology competency does not significantly predict techno-entrepreneurship competency.

The result shows that digital technology competency did not significantly predict techno-entrepreneurship competency, $\beta = .001$, $p = .983$. Since the p-value is greater than .05, the null hypothesis was not rejected.

Hypothesis Three

H03: Artificial intelligence competency and digital technology competency do not jointly significantly predict techno-entrepreneurship competency.

The overall regression model was not significant, $F(2, 207) = .039$, $p = .961$. Therefore, the null hypothesis was not rejected. AI competency and digital technology competency did not jointly significantly predict techno-entrepreneurship competency.

Discussion of Findings

The first finding showed that vocational education students demonstrated a high level of AI competency, with a mean score of 2.65. This finding suggests that the respondents possessed a relatively high level of capability in using AI tools for activities represented by the study's AI competency items, including generating ideas, analyzing information and supporting decision-making while considering responsible use. The finding is broadly consistent with the growing emphasis on AI competency development in education. UNESCO's AI Competency Framework for Students emphasizes the development of students' capacity to understand, apply and create with AI while maintaining human-centered and ethical considerations (Miao et al., 2024). However, the finding should be interpreted as evidence of perceived competency rather than proof of advanced technical AI expertise.

The second finding showed that students had a high level of digital technology competency, with a mean of 3.04. This was the highest of the three competency measures. The result is consistent with the growing emphasis on digital skills as a foundation for participation in Nigeria's digital economy. The World Bank (2019) identifies digital skills as a fundamental component of digital transformation and highlights the need to strengthen digital capabilities in Nigeria. The finding is also broadly consistent with Okoro and Okoro (2025), whose study demonstrated the relevance of digital technology competencies among postgraduate business education students in relation to employability. The present

finding therefore indicates that the students possessed considerable exposure to and perceived ability in the use of common digital technologies.

The third finding indicated a high level of techno-entrepreneurship competency, with a mean of 2.65. This finding is consistent with the competency-oriented perspective of entrepreneurship, which regards entrepreneurial competence as involving multiple capabilities associated with entrepreneurial tasks and enterprise development (Man et al., 2002). It also agrees with Mitchelmore and Rowley (2010), who emphasized the importance of entrepreneurial competencies to business development and success. The finding suggests that the vocational education students perceived themselves as capable of identifying opportunities, developing solutions, preparing simple business plans and applying vocational, digital and entrepreneurial skills to self-employment activities.

The fourth finding showed that AI competency did not significantly predict techno-entrepreneurship competency. The negative standardized coefficient was very small, $\beta = -.019$, and statistically non-significant ($p = .781$). This finding differs from Edokpolor et al. (2026), who reported a significant positive relationship between AI-driven technological application and entrepreneurial career intentions among vocational business students in Nigerian universities. The difference may partly reflect the different criterion variables used in the two studies. Edokpolor et al. examined entrepreneurial career intentions, whereas the present study examined techno-entrepreneurship competency. A student may intend to pursue entrepreneurship as a career without necessarily possessing the practical competencies required to establish and manage a technology-supported enterprise. Thus, the present result suggests that AI competency alone may not be sufficient to produce measurable differences in techno-entrepreneurship competency.

The fifth finding showed that digital technology competency did not significantly predict techno-entrepreneurship competency, $\beta = .001$, $p = .983$. Although students reported a high level of digital technology competency, the regression result indicates that differences in digital competency did not explain differences in techno-entrepreneurship competency within the sample. This finding differs from the broader implications of Okoro and Okoro (2025), who identified digital technology competencies as important to employability among postgraduate business education students. The difference may again be explained by the outcome variable. Employability and techno-entrepreneurship competency are related but distinct constructs. Digital technology skills may improve an individual's ability to perform work tasks without necessarily developing the opportunity-recognition, innovation, business planning and enterprise-management capabilities required for techno-entrepreneurship.

The sixth finding showed that AI competency and digital technology competency jointly explained only 0.04% of the variance in techno-entrepreneurship competency, with the overall model being non-significant, $F(2, 207) = .039$, $p = .961$. This is a particularly important finding because it indicates that high levels of perceived technological competence did not automatically translate into higher levels of techno-entrepreneurship competency in this sample. From the perspective of Human Capital Theory, education and skills constitute forms of productive human capital (Becker, 1964). However, the present finding indicates that different forms of human capital may not have equal or direct effects on a particular outcome. Technological competencies may need to be complemented by entrepreneurial experience, business planning, creativity, opportunity recognition, financial literacy, mentorship and practical enterprise exposure before they produce stronger techno-entrepreneurial capabilities.

Conclusion

The study examined artificial intelligence competency and digital technology competency as predictors of techno-entrepreneurship competency among vocational education students in Colleges of Education in South-East Nigeria. The findings showed that the students demonstrated high levels of AI competency, digital technology competency and techno-entrepreneurship competency. However, neither AI competency nor digital technology competency significantly predicted techno-entrepreneurship competency, and the two predictors did not jointly make a significant contribution to the criterion variable.

The findings suggest that technological competency should not be viewed as automatically producing entrepreneurial competency. While students may possess the ability to use AI and digital technologies, the translation of such capabilities into techno-entrepreneurial competence may require complementary entrepreneurial knowledge, practical experience, opportunity-recognition skills, creativity, business planning and enterprise development opportunities.

Recommendations

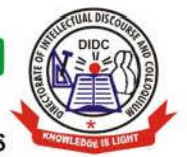
Based on the findings, the following recommendations were made:

1. Colleges of Education should integrate AI and digital technology training with practical entrepreneurship education so that students can apply technological skills to authentic enterprise problems rather than learning technology in isolation.

2. Vocational education programmes should strengthen practical enterprise activities, including business-plan development, opportunity identification, product development, digital marketing and customer engagement.
3. Entrepreneurship education should incorporate AI-enabled business projects in which students use AI and digital technologies to identify problems, generate solutions, analyze market information and develop technology-supported products or services.
4. Colleges of Education should provide mentorship and enterprise incubation opportunities through which students can transform classroom competencies into practical entrepreneurial experiences.
5. Teacher educators should receive continuing professional development in AI, digital technologies and techno-entrepreneurship pedagogy so that they can effectively integrate emerging technologies with vocational and entrepreneurial learning.
6. Further research should examine additional predictors of techno-entrepreneurship competency, such as entrepreneurial self-efficacy, creativity, practical business experience, financial literacy, mentorship, opportunity recognition and access to digital infrastructure.

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