



## EVALUATION OF THE RELEVANCE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) COMPETENCIES TO THE EFFECTIVENESS OF ENTREPRENEURSHIP EDUCATION IN POLYTECHNICS IN NIGERIA

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### **Abstract**

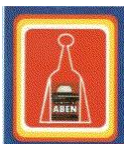
Information and communication technology (ICT) and entrepreneurial education are two crucial fields that have a big impact on the development of the abilities and knowledge required for the digital age. Thus, this study evaluated the relevance of ICT competencies to the effectiveness of entrepreneurship education in polytechnics in Nigeria. The study analyzed the collective and individual relevance of ICT competencies to the effectiveness of entrepreneurship education in polytechnics in Nigeria. Two research questions and two hypotheses were formulated for the study. The study adopted a descriptive survey design. A total of 205 HND II students 2022/2023 academic session drawn through random sampling technique from some departments in Abia state polytechnic, Aba participated in the study. A well structured questionnaire on a 4-point scale was used as instrument for data collection, while the reliability test for the instrument yielded co-efficient 0.85 for the clusters using Cronbach Alpha. The data used for the study were computer literacy ( $X_1$ ), digital communication and cyber security ( $X_2$ ), web presence and online branding ( $X_3$ ), data analysis and interpretation ( $X_4$ ), digital marketing and e-commerce ( $X_5$ ), and the effectiveness of entrepreneurship education ( $Y$ ). 190 copies of the questionnaire instruments were retrieved out of 205 copies distributed. Data collected were subjected to multiple regression analysis on the basis which a relationship model was estimated using mainly primary data source. On the basis of the multiple regression output, a relationship model was estimated. The result of the multiple regression analysis revealed that at a significance level of 0.05, all the five ICT competencies ( $X_1$ ,  $X_2$ ,  $X_3$ ,  $X_4$ , and  $X_5$ ) are as a whole and/or individually has significant relevance on the effectiveness of entrepreneurship education. It was concluded that all the five ICT competencies aspects contribute significantly in predicting the effectiveness of entrepreneurship education by explaining the effectiveness of entrepreneurship education by 51.4%. It was recommended among others that ICT should be integrated into entrepreneurship education as this will help polytechnics to produce graduates who are well-equipped to navigate the digital landscape and support economic growth.

**Keywords:** *Relevance, Information and Communication Technology, Entrepreneurship Education*

### **Introduction**

All educational levels can benefit from studying entrepreneurship. In recent years, a number of subject disciplines, including science, administration, marketing, and art, have incorporated the idea of entrepreneurship education. Recent international educational techniques encourage the fusion of Information and communication Technology (ICT) and entrepreneurship education. Presently, ICT has served as one of the key pillars of modern society. In many nations, learning and mastering fundamental ICT concepts and abilities are already seen as being an integral element of core academic subjects (Sulaiman, Surajo, Matinja, 2020; Nunfan, Asitik & Afrifa-Yamoah, 2022). ICT covers a wide range of technologies and applications, including computers, telecommunications, the internet, digital devices, software applications, and other digital tools. It comprises of a wide range of technical products and services that are used to create, save, communicate, share, and manage information. ICT has stimulated expansion in many areas of economic relations, not the least of which is the rise of entrepreneurial skills (Igbongidi, 2022).

Entrepreneurship and small business are the basics of economy, responsible for breakthrough, innovations that influence the growth of free market economy and its general performance. Entrepreneurship is more than simply starting a business. It is the process through which individuals identify opportunities, allocate resources and create value (Iheukwumere, Uteh & Peter, 2017). Entrepreneurship is a lifelong process that begins in elementary school and continues through all stages of education, including adult education (Okoye, 2018). It is the act of grasping an opportunity to provide value, regardless of whether this opportunity requires the knowledge of a brand-new organization. By immersing youngsters in real-world learning experiences where they can take risks, handle the results, and learn from the conclusion, it trains them to be responsible and highly enterprising future entrepreneurs or entrepreneurial thinkers. Through entrepreneurship education, people of all abilities, including those who



are physically challenged, can obtain the highly transferrable skills that employers are looking for, such as organization, management, leadership, and interpersonal skills. Learners' entrepreneurial knowledge, abilities, and attitudes or viewpoints toward effectively starting and running a business, advancing their careers, or leading fulfilling lives are developed through entrepreneurship education courses and activities (Chen, Ifenthaler, Sun, Xu, & Yan, 2022).

Paul-Mgbeafulike & Onyeneke (2022) define entrepreneurial education as a process aimed at equipping learners with the skills, drive, and desire to support entrepreneurial success in a range of situations. In the process of preserving, beginning, and maintaining a commercial operation, it focuses on those attitudes and abilities that are required for the individual to respond to its business environment. Entrepreneurship education has made a significant contribution that is crucial for the overall growth of the country as well as an individual's self-development. According to Nwanorue (2019), entrepreneurship education in Nigeria has made significant contributions to national and regional development, increased job creation, individual competence and self-development, economic growth, and social change.

According to Atah, Bessong & Ititim (2022), information and management technology competences are skills required to effectively manage and use technology in an organizational setting. These abilities are essential for those whose employment involves controlling and using technology to achieve organizational goals. Information and communication technology competencies according to Okoye (2022); Odusina, Dasaolu, & Agbonna (2022) and Ademiluyi (2021) include ability to source information online, ability to send and receive email, ability to use different social media platforms for business activities, ability to conduct electronic meetings, ability to use Microsoft word to process different correspondence among others.

ICT (Information and Communication Technology) and entrepreneurship education are two important areas that have a significant impact on the development of skills and knowledge needed for the digital age. While ICT education focuses on giving people the abilities and information they need to effectively use and harness technology in a variety of spheres of their lives. It covers a wide range of subjects, including information systems, programming, data analysis, cyber security, and computer literacy. Entrepreneurship education strives to promote an entrepreneurial mindset and provide people with the skills and knowledge they need to launch and run their own projects or businesses (Orifamah, Amaechi, Iwunna, & Alison, 2022). It focuses on enhancing abilities including innovation, problem-solving, critical thinking, leadership, and business management.

Entrepreneurship education encourages individuals to identify opportunities, weigh their risks, and invent new ways to add value. Idea generation, market research, company planning, financial management, marketing, and networking are all included in this broad definition of entrepreneurship. Together, ICT and entrepreneurship education equip individuals with a comprehensive skill set required to thrive in the digital economy and contribute to societal and economic development. The intersection of ICT and entrepreneurship education is highly relevant in the digital age. According to Deveci & Seikkula-Leino (2023) ICT and entrepreneurship education compliments each other in the following ways:

- a. **Technology Empowerment:** ICT training gives people the technical know-how they need to make use of digital tools and platforms for entrepreneurship. It enables ambitious business owners to use technology for data analysis, automation, internet marketing, and e-commerce.
- b. **Technology Innovation:** ICT education fosters people's capacity for invention and the creation of technology solutions.
- c. **Digital Transformation:** To establish cutting-edge business models and efficiently reach customers, entrepreneurs must adapt to technology advancements, comprehend emerging trends, and use digital techniques.
- d. **Entrepreneurial Mindset:** Entrepreneurship education places a strong emphasis on helping students adopt a growth-oriented, flexible, and resilient mindset. This approach can be complemented by ICT education, which teaches people how to be tech-savvy, adaptive to new technologies, and open to using digital solutions to fuel their entrepreneurial pursuits.
- e. **Digital Entrepreneurship:** The emergence of digital entrepreneurship is the result of the fusion of ICT and entrepreneurial education. This entails using digital technologies to create and expand enterprises in the digital sphere, such as mobile apps, e-commerce platforms, software-as-a-service (SaaS) models, and online marketplaces.

Okoye (2018); Aliu & Aigbavboa (2023) and Dabbous, Barakat & Kraus (2023) noted that to effectively leverage ICT in entrepreneurship education, individuals need to acquire a specific set of ICT skills which enable entrepreneurs to harness the power of technology and use it to drive their business ventures. These ICT skills that are particularly important for effective entrepreneurship education according to Iheukwumere



et al (2017) include: data analysis and interpretation, digital marketing, e-commerce and online sales, web presence and online branding, digital communication, cyber security awareness, computer literacy, problem solving and critical thinking, automation and workflow Optimization.

The relevance of ICT competencies on entrepreneurship education in polytechnics can be significant. ICT skills give students the knowledge and abilities to use technology efficiently, which enhances entrepreneurship education in polytechnics. These skills enable students to create original business concepts, gain access to international markets, streamline operations, and establish connections with entrepreneurial support networks. Polytechnics may generate graduates who are well-equipped to navigate the digital landscape and support economic growth through entrepreneurial endeavors by integrating ICT into entrepreneurship instruction.

Dabbous et al (2023) opined that ICT competencies can enhance entrepreneurship education in the following ways:

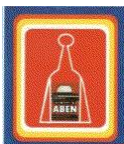
- a. Enhanced Business Planning and Analysis: The use of digital tools and software for performing market research, analyzing industry trends, and determining the viability of business concepts is made possible by students' ICT competencies.
- b. Technological Innovation and Product Development: Students' ability to innovate and create technology-driven goods and services is fostered by ICT competencies. It enables students to develop original ideas and maintain their competitiveness in markets that are rapidly changing.
- c. Adaptability to Technological Advances: Students who gain ICT competencies can stay up with new technologies, use them to grow their businesses, and innovate constantly in their entrepreneurial endeavors.
- d. Digital Marketing and E-commerce: ICT skills give students the knowledge and abilities to use internet marketing tools and platforms to promote their business operations. They are able to develop and administer websites, make use of social media marketing, improve search engine visibility, and put e-commerce solutions into practice.
- e. Access to Global Markets: Through digital platforms and e-commerce solutions, students can overcome geographical barriers and reach customers worldwide.
- f. Improved Operational Efficiency: Student can learn to use productivity tools, project management software, and data analysis tools to streamline workflows, automate processes, and manage resources effectively.
- g. Entrepreneurial Support Systems: Students can leverage online resources, entrepreneurship platforms, and digital communities to connect with mentors, investors, and fellow entrepreneurs. They can participate in virtual incubation programs, online competitions, and networking events. These support systems provide guidance, feedback, and opportunities for collaboration and growth.

At this digital age, the goal of entrepreneurship education at Nigerian tertiary institutions is to develop graduates into self-sufficient and job-creating individuals. The implementation of entrepreneurial education, however, does not appear to be having the expected impact. As a result, an increasing number of graduates have flooded both rural and urban regions in search of nonexistent white-collar jobs. It is concerning that so many young people, who are capable of boosting economic growth in the contemporary technical and digital age, are splurging without working in industries that are conducive to economic progress. Gross underfunding of public education in Nigeria appears to be making things worse (Paul-Mgbeafulike & Onyeneke, 2022). According to Suleiman, et al (2020) and Igbongidi (2022) the problems confronting ICT utilization in entrepreneurship education in higher institutions include: lack of technical skills and training, curriculum integration, digital literacy, access and infrastructure, pedagogical shift, technological obsolescence, assessment and evaluation of students among others. The greatest developmental issue facing Nigeria, according to Azenabor (2021), is the country's chronically underfunded public education system.

There are many advantages to integrating information and communication technology (ICT) into entrepreneurship education, including improved learning opportunities, access to resources, and the development of digital skills, but there are also a number of difficulties that educators may encounter. A comprehensive strategy that involves infrastructure investment, teacher training, curriculum creation, and support for students' digital literacy is needed to address these issues. To successfully integrate ICT in entrepreneurship education and reap its benefits, collaboration between stakeholders is essential. This includes educators, policymakers, and technology providers.

### **Statement of the Problem**

In Nigeria, the educational activity should be centered on the students in order for them to acquire maximum skills acquisition for self-development and employment. The new market demands have caused



many graduates with various certificates to be unemployed, due to poor quality of education, as the level of practical skills acquired by students is nothing to compare with demands of labour market and technological advancement (Usman, 2022). Students should be adequately prepared with the required ICT entrepreneurship skills to enable them to be successful future entrepreneurs in the current phase of technology advances in the business sector. These modern technological abilities cover teleconferencing, multimedia technology, webCT, formatting tools, web-based initiatives, and computer and internet access. Igbongidi (2022) lamented that the National Policy's introduction of business education as an entrepreneurial base curriculum in Nigerian schools did not fully live up to promises. The tools required to teach the skills are woefully insufficient. Though ICT competencies enhance entrepreneurship education in polytechnics by providing students with the skills and knowledge to leverage technology effectively; most of the polytechnics graduates still lack the ICT entrepreneurship competencies to thrive in today's digital age. The problem of this study therefore is to evaluate the relevance of ICT competencies on the effectiveness of entrepreneurship education in polytechnics in Nigeria.

The following research questions guided the study:

1. To what extent do collective ICT competencies relevant to the effectiveness of entrepreneurship education in polytechnics in Nigeria?
2. To what extent do the individual ICT competencies relevant to the effectiveness of entrepreneurship education in polytechnics in Nigeria?

**Research Hypothesis**

The following hypotheses were tested at 0.05 level of significance.

- Ho<sub>1</sub>: The collective ICT competencies have no significant relevance on the effectiveness of entrepreneurship education in polytechnics in Nigeria.
- Ho<sub>2</sub>: The individual ICT competencies have no significant relevance on the effectiveness of entrepreneurship education in polytechnics in Nigeria.

Content Analysis was performed on all the identified ICT competencies in order to reduce them to a considerable number to be used in the study, and to eliminate collinearity between them, they were clustered in their similarities as shown in Table 1

**Table 1: Clustering of the identified ICT competencies relevant to the effectiveness of entrepreneurship education in polytechnics in Nigeria**

S/N	Structural factors	Non-adopting factors
1	Computer operations Internet and web browsing Word processing Spreadsheets Email and communication Presentation	Computer literacy competencies
2	Effective communication Privacy and data protection Phishing awareness Password management Data backup and recovery	Digital communication and cyber security awareness competencies
3	Branding strategy Content creation Website development Social media management Online advertising Online marketing and collaboration	Web presence and online branding competencies
4	Data collection and cleaning Data exploration and visualization Statistical analysis Data modeling and predictive analytics Data interpretation Critical thinking and problem-solving Data visualization and story telling Data-driven decision making	Data analysis and interpretation skills
5	Search engine optimization Social media marketing Content marketing Pay-per-click advertising	Digital marketing and e-commerce competencies



Customer relationship management  
Web analytics

**Method**

The survey research design was adopted in conducting this study. The population consisted of 580 HND II students of 2022/2023 academic session from Abia state polytechnic, Aba. A sample of 205 HND II students 2022/2023 academic session was selected using random sampling technique from some departments. The instrument for data collection was a researcher structured developed questionnaire titled: the relevance of ICT competencies to the effectiveness of entrepreneurship education in polytechnics in Nigeria. The instrument was structured on a four-point rating scale of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The instrument had two sections: A and B. Section A contained respondents demographic data, while section B contained 25 items in six clusters namely: computer literacy (X<sub>1</sub>), digital communication and cyber security (X<sub>2</sub>), web presence and online branding (X<sub>3</sub>), data analysis and interpretation (X<sub>4</sub>), digital marketing and e-commerce (X<sub>5</sub>) and effectiveness of entrepreneurship education (Y). This helped to analyze the respondent's views about the variables for ICT competencies effectiveness of entrepreneurship education. The internal consistency of the instrument was determined using the Cronbach Alpha which yielded an overall reliability coefficient of 0.85 for the five clusters.

Data collected were subjected to multiple regression analysis using the SPSS (Statistical package for Social Sciences) software. The effectiveness of entrepreneurship education was regressed against five variables of the relevance of ICT competencies to the effectiveness of entrepreneurship education. The model describing the relationship is expressed as

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \dots\beta_nX_n + \epsilon_1$$

For the purpose of this study,

Y = Entrepreneurship education

X<sub>1</sub> = Computer literacy

X<sub>2</sub> = Digital communication and cyber security awareness

X<sub>3</sub> = Web presence and online branding

X<sub>4</sub> = Data analysis and interpretation

X<sub>5</sub> = Digital marketing and E-commerce

**Model Estimation and Result Discussion**

**Multicollinearity Test**

**Table 2: Correlations**

	Y	X1	X2	X3	X4	X5
Pearson Correlation Y	1.000	.345	.464	.428	.315	.589
X1	.345	1.000	.399	.143	.073	.241
X2	.464	.399	1.000	.529	.029	.227
X3	.428	.143	.529	1.000	.141	.258
X4	.315	.073	.029	.141	1.000	.280
X5	.589	.241	.227	.258	.280	1.000
Sig. (1-tailed) Y		.000	.000	.000	.000	.000
X1	.000		.000	.025	.159	.000
X2	.000	.000		.000	.344	.001
X3	.000	.025	.000		.026	.000
X4	.000	.159	.344	.026		.000
X5	.000	.000	.001	.000	.000	
N Y	190	190	190	190	190	190
X1	190	190	190	190	190	190
X2	190	190	190	190	190	190
X3	190	190	190	190	190	190





X4	190	190	190	190	190	190
X5	190	190	190	190	190	190

The above table shows that there is a high correlation between the independent variables and the dependent variable. This indicates that the independent variables are a good predictor for the dependent variable. There is no correlation between the independent variables as the correlation between the independent variables is below 0.3.

**Relationship Model Estimation and Interpretation**

In estimating the model, the data collected were subjected to multiple regression analysis. The result obtained from the multiple regression analysis is as follows:  $R = 0.717$ ,  $R^2 = 0.514$ , adjusted  $R^2 = 0.501$ ,  $F_{cal} = 38.982$ ,  $Sig = 0.000^a$

Using the regression output, the estimated relationship model is thus:

$$\text{Overall Effectiveness of Entrepreneurship Education (Y)} = 5.211 + (0.89 \times X_1) + (0.163 \times X_2) + (0.113 \times X_3) + (0.105 \times X_4) + (0.330 \times X_5) \dots (1)$$

**Table 3: ANOVA for the Constructs**  
**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	850.378	5	170.076	38.982	.000 <sup>a</sup>
	Residual	802.785	184	4.363		
	Total	1653.163	189			

a. Predictors: (Constant), X5, X2, X4, X1, X3; b. Dependent Variable: Y

The above table presents the ANOVA report on the general significance of the model. As p is less than 0.05, the model is significant. Thus the combination of the variables significantly predicts the dependent variable  $F(5, 184) = 38.982$ ,  $p < 0.001$ . This shows that the collective variables of ICT competencies: computer literacy, digital communication and cyber security awareness, web presence and online branding, data analysis and interpretation, and digital marketing and e-commerce together have significant relevance on the effectiveness of entrepreneurship education in polytechnics in Nigeria. The model and data are well fit in explaining the relevance of ICT competencies on the effectiveness of entrepreneurship education.

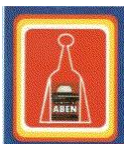
**Testing for relative contributions of the individual independent variables**

**Collinearity Diagnostic Test**

**Table 4: Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	5.211	1.089		4.784	.000		
	X1	.089	.044	.116	2.029	.044	.805	1.243
	X2	.163	.046	.234	3.554	.000	.608	1.65
	X3	.113	.045	.156	2.512	.013	.682	1.46
	X4	.105	.036	.159	2.949	.004	.909	1.10
	X5	.330	.044	.423	7.514	.000	.834	1.20

Predictors are computer literacy, digital communication and cyber security awareness, web presence and online branding, data analysis and interpretation, and digital marketing and e-commerce; Dependent variable: Effectiveness of entrepreneurship education.



The table above shows that the tolerance values for (X1, X2, X3, X4, and X5) are well above the threshold, while the Variance Inflation Factor (VIF) values are all below 10. This is a strong indicator that there are no multicollinearity concerns between the independent variables.

### Ranking of the Factors

Using the result from Pearson ranking correlation, the factors are ranked in the table 4 below:

**Table 5: Ranking of the Factors in Relation to the effectiveness of Entrepreneurship Education**

Ranking	Effectiveness of Entrepreneurship Education	Pearson Correlation Score
1	Digital marketing and e-commerce	.589
2	Digital communication and cyber security awareness	.464
3	Web presence and online branding	.428
4	Data analysis and interpretation	.345
5	Computer literacy	.315

The result from table 4 will add to existing literature on the subject matter. The findings indicate that digital marketing and e-commerce is the most influential ICT competencies that affect the effectiveness of entrepreneurship education in polytechnics in Nigeria as it made the important contribution. The five factors in this research was ranked using Pearson correlation; in accordance with how much each of the factors predicts the effectiveness of entrepreneurship education in polytechnics in Nigeria.

### Discussion

Results are discussed in the context of research questions and tested hypotheses

#### **Question One: To what extent do collective ICT competencies relevant to the effectiveness of entrepreneurship education in polytechnics in Nigeria?**

The test of hypothesis on research question one showed that ICT competencies are relevant to the effectiveness of entrepreneurship education. The conclusion was drawn from the ANOVA reports on the general significance of the model. It shows that ( $R = 0.717$ ;  $R^2 = 0.514$ ; Adjusted R Square=0.501; Standard Error of the Estimation=2.089;  $p = 0.000$ ). As  $p < 0.05$ , the model is significant. Thus the combination of the variables significantly predicts the dependent variable ( $F = 38.982$ ;  $p < 0.05$ ). It indicates that the model and data are well fit in explaining the relevance of ICT competencies to the effectiveness of entrepreneurship education in polytechnics in Nigeria. Therefore, the null hypothesis  $H_{01}$  is rejected and the alternative hypothesis  $H_{A1}$  is accepted which states that the collective aspects of ICT competencies have significant effect on the effectiveness of entrepreneurship education in polytechnics in Nigeria.

#### **Question Two: To what extent do the individual ICT competencies relevant to the effectiveness of entrepreneurship education in polytechnics in Nigeria?**

The test of hypothesis on research question two showed the report of the individual aspect of ICT competencies when regressed with the effectiveness of entrepreneurship education. It shows that computer literacy as ( $B = 0.89$ ; Beta = 0.116;  $p = 0.044$ ; tolerance = 0.805) as  $p < 0.05$ , the model is significant. Thus, this combination of the variable significantly predicts the dependent variable ( $t = 2.029$ ;  $p < 0.05$ ). It indicates that computer literacy has a significant relevant on the effectiveness of entrepreneurship education in polytechnics in Nigeria.

It also shows that digital communication and cyber security awareness aspect as ( $B = 0.163$ ; Beta = 0.234;  $p = 0.000$ ; tolerance = 0.608) as  $p < 0.05$ , the model is significant. Thus, this combination of the variable significantly predicts the dependent variable ( $t = 3.554$ ;  $p < 0.05$ ). It indicates that digital



communication and cyber security awareness has a significant relevant on the effectiveness of entrepreneurship education in polytechnics in Nigeria. It also shows that web presence and online branding aspect as ( $B = 0.093$ ;  $\text{Beta} = 0.096$ ;  $p = 0.000$ ; tolerance = 0.540) as  $p < 0.05$ , the model is significant. Thus, this combination of the variable significantly predicts the dependent variable ( $t = 1.443$ ;  $p < 0.05$ ). It indicates that web presence and online branding has a significant relevant on the effectiveness of entrepreneurship education in polytechnics in Nigeria.

It also shows that data analysis and interpretation aspect as ( $B = 0.113$ ;  $\text{Beta} = 0.156$ ;  $p = 0.013$ ; tolerance = 0.682) as  $p < 0.05$ , the model is significant. Thus, this combination of the variable significantly predicts the dependent variable ( $t = 2.512$ ;  $p < 0.05$ ). It indicates that data analysis and interpretation has a significant relevant on the effectiveness of entrepreneurship education in polytechnics in Nigeria. It also shows that digital marketing and e-commerce aspect as ( $B = 0.330$ ;  $\text{Beta} = 0.423$ ;  $p = 0.000$ ; tolerance = 0.834) as  $p < 0.05$ , the model is significant. Thus, this combination of the variable significantly predicts the dependent variable ( $t = 7.514$ ;  $p < 0.05$ ). It indicates that digital marketing and e-commerce has a significant relevant on the effectiveness of entrepreneurship education in polytechnics in Nigeria. Thus each of the 5 ICT competencies aspects contributed to the effectiveness of entrepreneurship education in polytechnics in Nigeria; with digital marketing and e-commerce, digital communication and cyber security awareness, web presence and online branding, data analysis and interpretation, computer literacy contributing 33.0%, 16.3%, 11.3%, 10.5 and 8.9% respectively.

### Conclusion

Based on the findings so far made on this paper, the following conclusions have been made: That collectively, all the five aspects of ICT competencies (computer literacy, digital communication and cyber security awareness, web presence and online branding, data analysis and interpretation, and digital marketing and e-commerce) influence the effectiveness of entrepreneurship education in polytechnics in Nigeria. Also, all the five ICT competencies aspects contribute significantly in effectiveness of entrepreneurship education in polytechnics in Nigeria by 51.4%. That individually, all the five aspects of ICT competencies (computer literacy, digital communication and cyber security awareness, web presence and online branding, data analysis and interpretation, and digital marketing and e-commerce) influence the effectiveness of entrepreneurship education in Nigeria. That digital marketing and e-commerce made the highest significant relevance on the effectiveness of entrepreneurship education. The results from the study also showed that digital communication and cyber security has a strong significant relevance on the effectiveness of entrepreneurship education; while web presence and online branding, data analysis and interpretation; and computer literacy have moderate significant relevance.

### Recommendations

Based on the findings of this study, the following recommendations are made:

1. ICT should be integrated into entrepreneurship education as this will help polytechnics to produce graduates who are well-equipped to navigate the digital landscape and support economic growth.
2. More ICT infrastructure in the form of hardware and software should be provided in laboratories and they should be regularly updated to minimize reliance on obsolete technologies.
3. Government should provide sufficient ICT resources in higher education institutions for efficient teaching and learning.

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